# EDP industry report and market review

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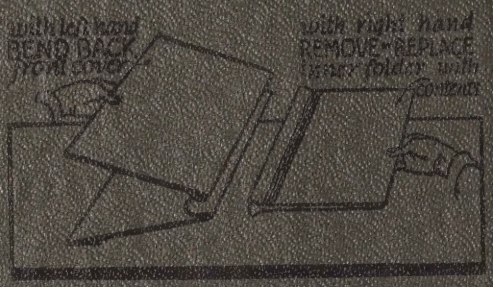

EDP industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

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EDP industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 31,1968 • VOL.4,NO.1 P.J.McGOVERN,EDITOR

Mid-year Review

## COMPUTER INDUSTRY SETTLES DOWN TO "NORMAL" GROWTH AS IBM INCREASES ITS SHARE OF THE MARKET

Following two "catch-up" years of staggering growth, it looks as if the computer industry has settled down to its normal, long-range explosive growth rate of between 16% and 17%. EDP/IR, to start this new volume, has just completed a mid-year look at the electronic data processing industry. Our study indicates that shipments of new computer equipment, by American manufacturers, totaled about $3.8 billion in the first half of 1968.

If this rate continued for the rest of the year, shipments would far outdistance our projections of six months ago (EDP/IR Jan.26,1968). We don't think this will happen. Some of the shipments during the first half of 1968 represent accelerated installations, by IBM, for customers originally slated to take deliveries in the second half of this year. Taking this into consideration, our current projection for industry shipments this year is $6.9 billion, 16.9% above last year's $5.9 billion.

IBM, in setting the computer industry pace, has increased its percentage of industry shipments several points above the 72.9% level of last year. We will report more exact figures within a few weeks, but at this time can safely say that the industry giant currently is shipping more than three-fourths of the value of computers manufactured by American-based companies.

The other major computer manufacturers, however, are doing well themselves. They don't have the flexibility or muscle to manipulate delivery schedules, if indeed this is what IBM has done in its effort to fill the expanded quotas required to meet a planned growth. Most of the "Seven Dwarfs," however, are happily looking at backlogs higher than ever before as they squeeze more profits out of established third-generation equipment. It's ironical that the other computer companies -- many of them divisions of leading U.S. corporations -- are seemingly pleased with limited growth in an industry that slowly is being dominated more and more by one company.

In this issue, which reviews the computer industry today and the major manufacturers of computer systems, EDP/IR presents some features that are designed to assist our readers in making their evaluations of the industry. Most of the charts are based on moving averages of data published in the Monthly Computer Census, and will be repeated at intervals throughout the year. We hope they assist readers in understanding and analyzing an important and complex industry.

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Prognosis at mid-1968, by manufacturer

Actually unaccoustomed to thinking about 17% growth as average, most of the computer manufacturers -- IBM excepted — seem to be quite happy with their almost automatic growth that approaches the industry norm. Growth is important; profits are most important. Squeezing the most out of current lines appears to be the trend. No one seems to be worried that IBM continues to gain a few percentage points in a rapidly growing industry. At this mid-point in one of the few years remaining before the new product race again puts the industry into a frenzied state of turmoil, here is our prognosis for each of the leading manufacturers of electronic data processing equipment:

Burroughs. The ring from Detroit is good. There is, in fact, only one cloud that could shade the near-term prospects for Burroughs: The 8500, the most powerful standard computer commercially available, is having the troubles that supercomputers seem to have. U.S. Steel signed up for the original 8500; some of its personnel want this machine. Burroughs has expanded, and complicated, this machine, and wants to deliver an improved version. Pick the right person at either company and get the answer you want. There will be a general-purpose B8500.

On other fronts, things for Burroughs seem good. It has taken its B200, a second-generation machine, and produced the low-cost B100, the B300, and the B500. These machines, still moving well, are providing a good stop-gap until the new B2500 and B3500s get into wide useage. And the B5500, a second-generation machine also, is holding up well and leading present customers into higher numbers of the line. Add to this a $100 million Air Force contract and some $60 million backlog for TC-500 terminals with British banking systems, and you come up with a real plus. Burroughs shows the highest backlog growth rate of any major manufacturer.

Control Data. If the merger with Commercial Credit Corp., the largest U.S. finance company, comes through, CDC could well be on the way to becoming a total service company. The company is still concentrated in the powerful machine market, and orders for the 6000 series machines are good, despite recent cutbacks in government-sponsored research programs. First deliveries of the specially built 7600 super-computers will begin late this year or early next year.

CDC has moved out of the position of being a basic systems supplier with the acquisition of American Business Systems (continuous forms and punched cards) and C-E-I-R (programming consulting services). It is strong in training services, has an entry into the small business computer market with its SCM product. The capital which Commercial Credit can supply will perhaps enable CDC to penetrate the real growth area of the computer market -- business-oriented data processing.

General Electric. This may be the real sleeper in the computer marketplace. Despite continuing loses, GE's computer operations are picking up volume and it is building up its staff. The company is clearly the leader in the time-sharing service business. Currently, over 50,000 users are being serviced by a 25-computer time-sharing network.

Indeed, GE has taken time sharing more seriously than virtually any other major computer manufacturer. It is buying back its own 265 computers as they become available, and is starting a popular service tied to its 600 series computers, which are under full control with GECOS operating system. Its time-sharing sales effort apparently is profitable. In addition, the company is pushing its new 420, 430, 440 line of time-sharing computers for customer use. All old equipment, but?



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Honeywell. Selective expansion is the keynote as Honeywell modifies or enlarges its line and pushes "upgrade." The first company into the third- or new-generation market, its original machine will be five years old when the announcement anniversiary arrives this December. The large machines in the 200 family, however, the H-4200 and H-8200, just start being delivered this year, so Honeywell would seem to locked into its present model line for a few more years. The deliveries of larger machines, however, should move Honeywell back up nearer the "Number Two" position it held in 1966 shipments.

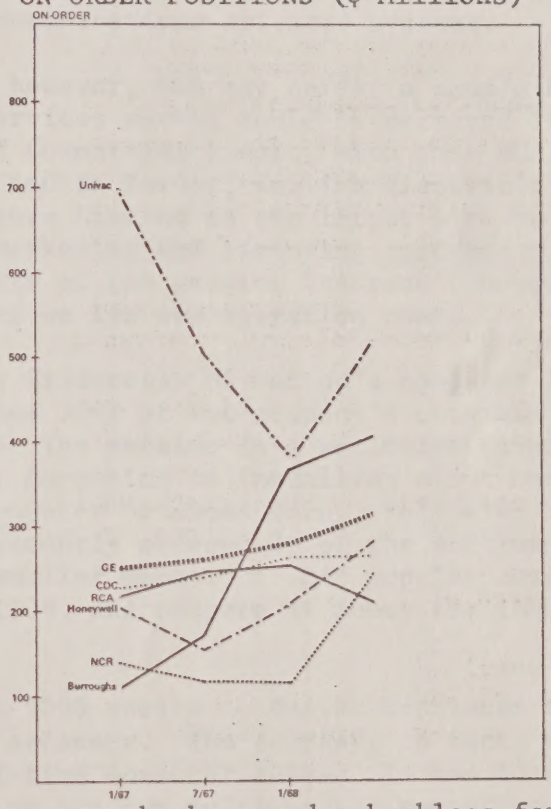
It has started major new business activities in the area of support; during this year Honeywell has announced a line of keyboard-to-tape peripherals, a disk pack manufacturing capability, and a new organization for the data communications market. Honeywell's backlog hit a low one year ago (see chart, below), but has been rising quickly since. With over 3000 customers (each upgrading at about 10% to 15% annually), the company would seem to have a firm position for the 1970 marketplace. Rumour has it that Honeywell's new computer line is under wraps and won't be announced until more profit can be squeezed out of Series 200.

IBM. The major key to the computer industry is the major mystery. IBM has a problem -- too much profit. It has been operating for several years on a planned program of profits, and has seen these get out of hand. Despite "giving effect to the 10% income tax surcharge recently enacted," the company's net earnings after taxes, as of mid-1968, were up 36.4% over the comparable period last year. Leasing companies' purchases of computers is the major cause.

But there are other problems with the giant. It is experiencing, this year, a fairly sharp flattening out of orders as customers are still digesting the flood of System/360 equipment delivered to them during the last two years. During this year, in fact, the order rate for new systems will probably drop to the lowest point in years. Special rating techniques are being established to help salesmen make their goals, but most of them are far below actual year-to-date quota assignments.

IBM apparently has told its salesmen to speed up deliveries. ("I know you wanted it in December, take it in September!") It is sponsoring sales contests to improve orders. But it has not effectively hit upon a way to solve the problem.

The nature of the computer marketplace is shifting. Much of the business now, and for the next few years, is "add-on." There are people who need new computers; many more need additions.




Above graph shows order backlogs for IBM's major competitors over the past two years. During this period, IBM's backlog has been declining about 10% each half-year, but still adds up to more than expected industry shipment level expected for 1968.



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Most sales representatives, however, have joined IBM since the introduction of System/360, and are trained to sell total systems. These men need tutorial assistance in the techniques of adding on.

During this year's remaining months, and for the next year or so, IBM will present a changing face to its DP salesmen, if not to its customers. It will likely introduce more new central processors, (Each model may become a family as the 20 virtually has.) plus new input/output equipment and mass memory units. The magnetic tape transcriber, which will be pushed, may be just a door opener.

Leasing companies have become a problem for IBM. They are a definite competitive threat to individual salesmen, and their business is pouring in profits that, by plan, should be spread over many years as leasing revenue. A real indication of IBM's stemming this money inflow has shown up in the pricing structure of the models 25 and 85. The rental-to-purchase ratios for these machines is in the 55- to 60-1 range rather than at about 47-1, for other members of System 360. The company's accelerated revenues, spurned by heavy purchasing activity on the part of leasing companies, will make IBM extremely attractive at least through the remainder of this year.

RCA. Orders for RCA's Spectra series are satisfactory if not spectacular. The company's computer operations continue to run at a slight loss because it has conservative accounting practices and because it is growing rapidly, with a corresponding increase of equipment on rental. The company's computer sales are especially strong in the area of multiple communications-oriented systems.

Because of marketplace developments, however, RCA may suffer a couple of setbacks. Its entry into the time-sharing services market could be deterred if CDC successfully consumates its acquisition of Commercial Credit, with whom RCA had planned a joint venture in time sharing. And in Europe, English Electric's merger into the newly formed International Computers Limited is the latest blow to RCA, which had pegged its European success to marketing and licensing agreements (EDP/IR July 24,1968). If the company wants a share of the growing European computer market, it will most likely be forced to start up its own operation there.

Univac. The 1108 continues to be the Cinderella of Univac's computer line, with installations and orders currently some 300% of the company's original expectations and the immediate outlook good. The machine is a worldwide favorite for computer utility networks: University Computing is installing about one a month, Western Union uses the 1108, and Computer Sciences Corp., following its merger agreement with Western Union, has recently ordered 20 of the machines. In the marketplace, now, there is talk of a smaller member of this popular computer. It would be software compatible with the 1108, and compete at about the IBM 360/50 price level.

In the lower price ranges -- with its 9000 series -- Univac continues to sell quite selectively, mostly to multi-system accounts. The company, in fact, may be becoming dependent on large-scale and real-time computer sales. It has seen the success of its customers, and is starting up its own multi-access operations that may well compete with its customers. This could well be the best solution for the company that currently is Number Two in the computer industry. Its sales force is reported weak except at the large machine and systems level, and it has proven equipment for remote-access computing. Since this appears to be one of the fastest growing areas of computer use, it could be that Univac has leapfrogged its problems and settled down to a successful approach into the 1970s.



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CUMULATIVE VALUE OF INSTALLED COMPUTERS MADE BY U.S. MANUFACTURERS
(Values, in $ Millions, calculated as purchase price of systems when shipped)

## THE GALLOMPHING GIANT

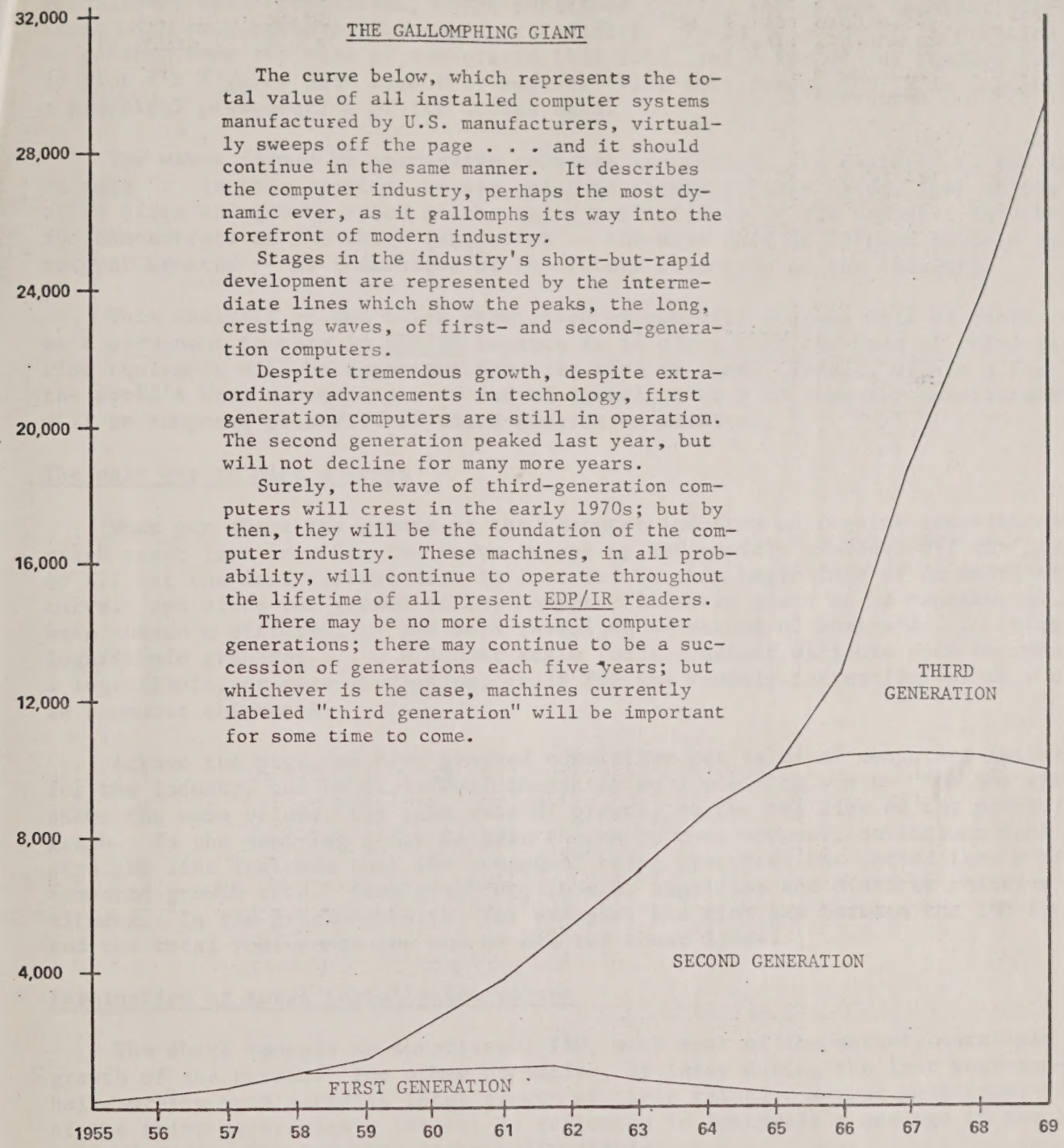
The curve below, which represents the total value of all installed computer systems manufactured by U.S. manufacturers, virtually sweeps off the page . . . and it should continue in the same manner. It describes the computer industry, perhaps the most dynamic ever, as it gallomphs its way into the forefront of modern industry.

Stages in the industry's short-but-rapid development are represented by the intermediate lines which show the peaks, the long, cresting waves, of first- and second-generation computers.

Despite tremendous growth, despite extraordinary advancements in technology, first generation computers are still in operation. The second generation peaked last year, but will not decline for many more years.

Surely, the wave of third-generation computers will crest in the early 1970s; but by then, they will be the foundation of the computer industry. These machines, in all probability, will continue to operate throughout the lifetime of all present EDP/IR readers.

There may be no more distinct computer generations; there may continue to be a succession of generations each five years; but whichever is the case, machines currently labeled "third generation" will be important for some time to come.



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## GRAPHS, CHARTS, AND CENSUS SYNOPSES

A regular feature of EDP Industry Report, since it was started over four years ago, has been a Monthly Computer Census. This perodic estimate of computer shipments and on-order positions is based on the continuing research program of the International Data Corporation, which publishes EDP/IR, and on our constant discussions with executives in the computer industry. There is a lot of information to be gleaned from the mass of numbers in this data, and a few of our readers carefully plot the figures each time they appear. With this issue, EDP/IR is inaugurating a graphical presentation of its Census data.

The waves formed by successive computer generations are captured in the graph on page 5. In this section, we are going to stratify these waves, look at the relative sizes and growth rates of the major participants in the computer industry, and concentrate on the third generation -- the wave that is largest to date and has not yet crested -- as indicative of the future structure of the industry.

This analysis of the third generation of computer systems will be continued as a permanent feature in EDP/IR because it is clear that the base of third-generation equipment will be important for some time to come. Indeed, within a few years, the world's base of computers -- and of rental revenue to computer manufacturers -- will be composed primarily of third-generation machines.

### The only way to plot a graph

When you chart the growth of the computer industry on regular (rectilinear) graph paper (see page 5), the curve sweeps up and rapidly explodes off the page, or all but the most current data is lost in the thin beginnings of an exponential curve. And since the growth of the computer industry seems to be exponential, we have chosen a different -- and more revealing -- method of analysis . . . semi-logarithmic graphing . . . a linear scale for a constant variable such as time and a logarithmic, or ever-increasing, scale for the rapidly increasing variable such as computer shipments.

Across the page, we have graphed cumulative net value of computers installed for the industry and by individual companies on a semi-log scale. The top line shows the same values, the same rate of growth, as the top line on the preceding graph. In the semi-log graph we have chosen to use, however, deviations from a straight line indicate that the component being presented has varied from a steady compound growth rate. Such graphing, though, magnifies and distorts relative magnitudes. In the graph opposite, for example, the tiny gap between the IBM line and the total represents the sum of all the lower lines.

### Examination of total installation values

The chart reveals no surprises. IBM, with most of the market, parallels the growth of the market. The other companies, at least during the last year-and-a-half, pretty much parallel total growth at their relative market positions. A bit of the third generation's impetus is reflected in Honeywell's upsurge in the last half of 1966. The industry looks quite stable.

But this chart hides the action. The important consideration now, and for some time to come, is the penetration by minor manufacturers into the base of third generation equipment. This presentation -- which will be published quarterly by EDP/IR -- is shown on the following pages.



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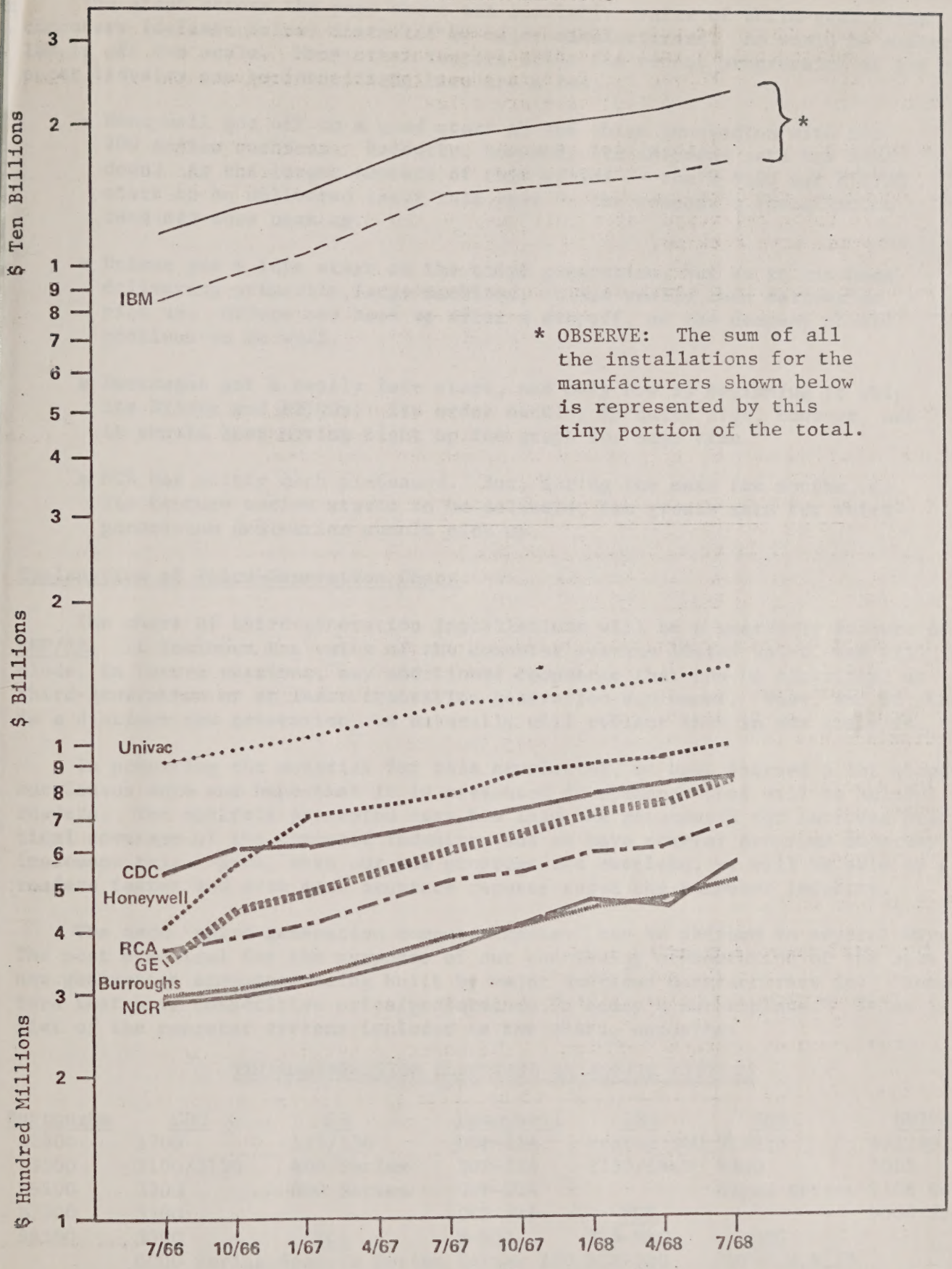
## TOTAL INSTALLATIONS



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## The third, critical generation

The graph across the page shows net cumulative value of third-generation computers (defined below) installed by major manufacturers. As would be expected, IBM is off the scale. Many other factors about the recent progression of the computer industry can be identified; here are a few:

- Honeywell got off to a good start in the third generation with its 200 series machines. Recently, however, its shipment rate has been down. As the larger members of this series -- the H-4200 and H-8200 start to be delivered later this year -- the company's installation rate may move back up.

- Univac got a late start on the third generation, but as it has been delivering primarily large machines, it has really seen deliveries pick up. Orders are back up after a dropoff, so the company should continue to do well.

- Burroughs got a really late start, and only now is beginning to ship its B2500s and B3500s. Its order backlog is quite high, however, and it should keep moving right up the graph for some time.

- NCR has pretty much plateaued. But, during the next few months, as its Century series starts to be deliverd, its growth rate for third-generation deliveries should pick up.

## Explanation of Third-Generation Chart

The chart of third-generation installations will be a quarterly feature of EDP/IR. It includes the value of the computer systems listed below, and will include, in future versions, any additional computers that can be classified as third-generation or at least transition generation equipment. When, and if, there is a distinct new generation, we naturally will reflect this in our analysis.

In preparing the material for this newsletter, we have learned a lot about our Census data and hope that it is presented in a manner that will be helpful to readers. The analysis presented here has laid the groundwork for improved statistical coverage of the computer industry, and we have several programs underway to implement this. Soon, when our new programs are complete, we will be able to give readers faster and even more accurate reports about the computer industry.

The term "third-generation computer system" can be defined in several ways. The most practical for the purposes of our continuing presentation of the base of new generation computers being built by major American manufacturers is: "computers that have competitive price/performance in today's marketplace." Below is a list of the computer systems included in the chart, opposite:

### THIRD-GENERATION COMPUTERS IN EDP/IR LISTING

| Burroughs | CDC | GE | Honeywell | IBM | SDS | UNIVAC |
|---|---|---|---|---|---|---|
| B2500 | 1700 | 115/130 | DDP-116 | System 360 | 92/925 | 491,492,494 |
| B3500 | 3100/3150 | 400 Series | DDP-124 | 1130/1800 | 9300 | 1005 |
| B6500 | 3300 | 600 Series | DDP-224 | | Sigma Series | 1108 Series |
| B7500 | 3500 | | DDP-516 | NCR | | 9000 Series |
| B8500 | 3800 | RCA | H-632 | 315-RMC | DEC | |
| | 6000 Series | Spectra Series | Series 200 | NCR-500 | PDP-7,8,9,10 | |



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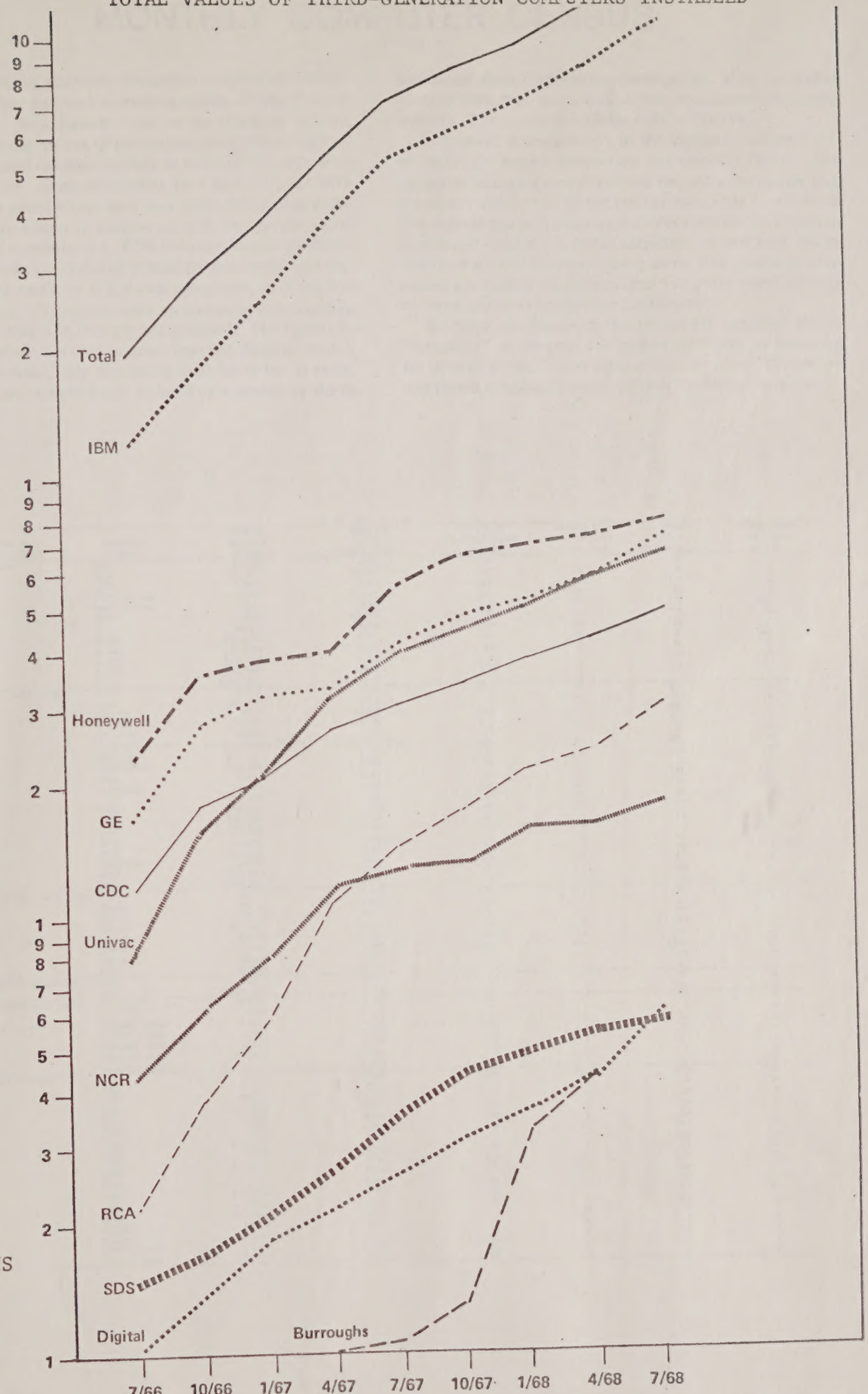
TOTAL VALUES OF THIRD-GENERATION COMPUTERS INSTALLED




July 31, 1968





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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, EDP Industry Report publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in EDP/IR.

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF JULY 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $4600 | 1/54 | 26 | 3 | 29 | X |
| | 220 | $14,000 | 10/58 | 27 | 2 | 29 | X |
| | B100 | $2800 | 8/64 | 183 | 29 | 212 | 4 |
| | B200 Series | $5400 | 11/61 | 465 | 85 | 550 | 9 |
| | B300 Series | $9000 | 7/65 | 347 | 87 | 434 | 111 |
| | B500 | $3800 | 10/68 | 0 | 0 | 0 | 88 |
| | B2500 | $5000 | 2/67 | 58 | 10 | 68 | 130 |
| | B3500 | $14,000 | 5/67 | 45 | 10 | 55 | 260 |
| | B5500 | $25,000 | 3/63 | 74 | 7 | 81 | 5 |
| | B6500 | $33,000 | 2/68 | 5 | 1 | 6 | 40 |
| | B7500 | $44,000 | 3/69 | 0 | 0 | 0 | 16 |
| | B8500 | $200,000 | 12/67 | 1 | 0 | 1 | 6 |
| Control Data Corp. | G-15 | $1600 | 7/55 | 278 | 12 | 290 | X |
| | G-20 | $15,500 | 4/61 | 18 | 2 | 20 | X |
| | LGP-21 | $725 | 12/62 | 152 | 3 | 155 | X |
| | LGP-30 | $1300 | 9/56 | 110 | 5 | 115 | X |
| | RPC-4000 | $1875 | 1/61 | 50 | 4 | 54 | X |
| | 160*/160A/160C | $2100/$5000/$12,000 | 5/60;7/61;3/64 | 468 | 39 | 507 | X |
| | 924/924A | $11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $45,000 | 1/60 | 49 | 3 | 52 | X |
| | 1700 | $3800 | 5/66 | 99 | 37 | 136 | 136 |
| | 3100/3150 | $10,000 | 12/64 | 101 | 25 | 126 | 29 |
| | 3200 | $14,000 | 5/64 | 46 | 16 | 62 | X |
| | 3300 | $20,000 | 9/65 | 88 | 23 | 111 | 35 |
| | 3400 | $18,000 | 11/64 | 15 | 4 | 19 | X |
| | 3500 | $25,000 | 7/68 | 0 | 0 | 0 | 26 |
| | 3600 | $52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $53,000 | 2/66 | 22 | 3 | 25 | 8 |
| | 6400/6500 | $56,000 | 5/66 | 34 | 11 | 45 | 28 |
| | 6600 | $115,000 | 8/64 | 31 | 8 | 39 | 16 |
| | 7600 | $150,000 | 11/68 | 0 | 0 | 0 | 2 |
| Digital Equipment Corp. | PDP-1 | $3400 | 11/60 | 56 | 3 | 59 | X |
| | PDP-4 | $1700 | 8/62 | 49 | 5 | 54 | X |
| | PDP-5 | $900 | 9/63 | 98 | 11 | 109 | X |
| | PDP-6 | $10,000 | 10/64 | 14 | 5 | 19 | X |
| | PDP-7 | $1300 | 11/64 | 139 | 41 | 180 | 4 |
| | PDP-8 | $525 | 4/65 | 1520 | 430 | 1950 | 40 |
| | PDP-9 | $1100 | 12/66 | 154 | 40 | 194 | 32 |
| | PDP-10 | $9000 | 10/67 | 16 | 1 | 17 | 12 |
| Electronic Associates | 640 | $1200 | 9/67 | 21 | 14 | 35 | 15 |
| | 8400 | $12,000 | 6/65 | 18 | 6 | 24 | 4 |
| EMR Computer Division | ASI 210 | $3850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $4200 | 12/63 | 7 | 0 | 7 | X |
| | ADVANCE 6020 | $4400 | 4/65 | 22 | 0 | 22 | 4 |
| | ADVANCE 6040 | $5600 | 7/65 | 7 | 3 | 10 | 4 |
| | ADVANCE 6050 | $9000 | 2/66 | 14 | 1 | 15 | 6 |
| | ADVANCE 6070 | $15,000 | 10/65 | 3 | 2 | 5 | 5 |
| | ADVANCE 6130 | $1550 | 10/67 | 16 | 3 | 19 | 16 |
| General Electric | 115 | $2200 | 12/65 | 330 | 430 | 760 | 500 |
| | 130 | $4500 | 3/69 | 0 | 0 | 0 | 100 |
| | 205 | $2900 | 6/64 | 15 | 0 | 15 | X |
| | 210 | $16,000 | 7/59 | 37 | 0 | 37 | X |
| | 215 | $6000 | 9/63 | 20 | 3 | 23 | X |
| | 225 | $8300 | 4/61 | 145 | 20 | 165 | X |
| | 235 | $12,500 | 4/64 | 112 | 24 | 136 | 24 |
| | 405 | $6000 | 2/68 | 21 | 4 | 25 | 65 |
| | 415 | $11,000 | 5/64 | 310 | 100 | 410 | 50 |
| | 425 | $18,000 | 6/64 | 113 | 33 | 146 | 42 |
| | 435 | $25,000 | 9/65 | 34 | 11 | 45 | 17 |
| | 625 | $50,000 | 4/65 | 38 | 7 | 45 | 21 |
| | 635 | $60,000 | 5/65 | 41 | 5 | 46 | 20 |
| | 645 | $90,000 | 7/66 | 6 | 0 | 6 | 3 |
| | GE-PAC 4020 | $5000 | 2/67 | 38 | 14 | 52 | 98 |
| | GE-PAC 4040 | $3000 | 8/64 | 42 | 14 | 56 | 9 |
| | GE-PAC 4050 | $7000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $8500 | 6/65 | 16 | 2 | 18 | 2 |



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AS OF JULY 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $2500 | 5/63 | 77 | 2 | 79 | X |
| | DDP-116 | $900 | 4/65 | 192 | 38 | 230 | 16 |
| | DDP-124 | $2050 | 3/66 | 51 | 17 | 68 | 19 |
| | DDP-224 | $3300 | 3/65 | 46 | 10 | 56 | 2 |
| | DDP-516 | $700 | 9/66 | 108 | 40 | 148 | 145 |
| | H-110 | $2500 | 9/68 | 0 | 0 | 0 | 175 |
| | H-120 | $3900 | 1/66 | 690 | 150 | 840 | 160 |
| | H-125 | $4600 | 12/67 | 28 | 2 | 30 | 80 |
| | H-200 | $8600 | 3/64 | 885 | 325 | 1210 | 130 |
| | H-400 | $8500 | 12/61 | 55 | 36 | 91 | X |
| | H-632 | $3500 | 11/68 | 0 | 0 | 0 | 29 |
| | H-800 | $28,000 | 12/60 | 76 | 14 | 90 | X |
| | H-1200 | $10,000 | 2/66 | 218 | 42 | 260 | 108 |
| | H-1250 | $10,000 | 8/68 | 0 | 0 | 0 | 35 |
| | H-1400 | $14,000 | 1/64 | 9 | 2 | 11 | X |
| | H-1800 | $42,000 | 1/64 | 17 | 4 | 21 | X |
| | H-2200 | $14,000 | 1/66 | 93 | 17 | 110 | 76 |
| | H-4200 | $20,500 | 7/68 | 0 | 0 | 0 | 28 |
| | H-8200 | $42,000 | 4/68 | 0 | 0 | 0 | 11 |
| IBM | 305 | $3600 | 12/57 | 68 | 26 | 94 | X |
| | 360/20 | $2800 | 12/65 | 4700 | 3350 | 8050 | 3950 |
| | 360/25 | $5330 | 1/69 | 0 | 0 | 0 | 2200 |
| | 360/30 | $9300 | 5/65 | 4625 | 3225 | 7850 | 2000 |
| | 360/40 | $19,000 | 4/65 | 2700 | 1000 | 3700 | 920 |
| | 360/44 | $15,000 | 7/66 | 280 | 80 | 360 | 155 |
| | 360/50 | $33,000 | 8/65 | 900 | 230 | 1130 | 960 |
| | 360/65 | $65,000 | 11/65 | 460 | 90 | 550 | 460 |
| | 360/67 | $138,000 | 6/66 | 34 | 8 | 42 | 38 |
| | 360/75 | $81,400 | 1/66 | 32 | 8 | 40 | 16 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 22 |
| | 360/90 Series | $150,000 | 11/67 | 3 | 0 | 3 | 16 |
| | 650 | $4800 | 11/54 | 96 | 29 | 125 | X |
| | 1130 | $1700 | 2/66 | 3125 | 1175 | 4300 | 4200 |
| | 1401 | $6200 | 9/60 | 3850 | 2200 | 6050 | X |
| | 1401-G | $2300 | 5/64 | 730 | 660 | 1390 | X |
| | 1401-H | $1300 | 6/67 | 300 | 200 | 500 | 180 |
| | 1410 | $17,000 | 11/61 | 385 | 205 | 590 | X |
| | 1440 | $4100 | 4/63 | 1970 | 1310 | 3280 | 60 |
| | 1460 | $9800 | 10/63 | 880 | 170 | 1050 | X |
| | 1620 I, II | $4000 | 9/60 | 940 | 500 | 1440 | X |
| | 1800 | $5100 | 1/66 | 390 | 140 | 530 | 330 |
| | 7010 | $26,000 | 10/63 | 152 | 26 | 178 | X |
| | 702 | $6900 | 2/55 | 4 | 0 | 4 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $32,000 | 12/55 | 20 | 2 | 22 | X |
| | 7040 | $25,000 | 6/63 | 56 | 47 | 103 | X |
| | 7044 | $36,500 | 6/63 | 100 | 34 | 134 | X |
| | 705 | $38,000 | 11/55 | 30 | 5 | 35 | X |
| | 7070, 2, 4 | $27,000 | 3/60 | 185 | 95 | 280 | X |
| | 7080 | $60,000 | 8/61 | 78 | 3 | 81 | X |
| | 709 | $40,000 | 8/58 | 4 | 0 | 4 | X |
| | 7090 | $63,500 | 11/59 | 20 | 16 | 36 | X |
| | 7094 | $75,500 | 9/62 | 97 | 3 | 100 | X |
| | 7094 II | $82,500 | 4/64 | 122 | 9 | 131 | X |
| National Cash Register | NCR-304 | $14,000 | 1/60 | 21 | 0 | 21 | X |
| | NCR-310 | $2500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $8700 | 5/62 | 435 | 235 | 670 | 50 |
| | NCR-315-RMC | $12,000 | 9/65 | 84 | 16 | 100 | 35 |
| | NCR-390 | $1850 | 5/61 | 90 | 260 | 350 | X |
| | NCR-500 | $1500 | 10/65 | 1250 | 750 | 2000 | 700 |
| | Century 100 | $2645 | 9/68 | 0 | 0 | 0 | 400 |
| | Century 200 | $7500 | 2/69 | 0 | 0 | 0 | 325 |
| Philco | 1000 | $7010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $40,000 | 10/58 | 13 | 1 | 14 | X |
| | 2000-212 | $52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $7000 | 2/61 | 404 | 207 | 611 | X |
| | RCA 3301 | $18,000 | 7/64 | 75 | 10 | 85 | X |
| | RCA 501 | $14,000 | 6/59 | 80 | 2 | 82 | X |
| | RCA 601 | $35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $4100 | 9/65 | 148 | 58 | 206 | 106 |
| | Spectra 70/25 | $6700 | 9/65 | 93 | 27 | 120 | 54 |
| | Spectra 70/35 | $8000 | 1/67 | 76 | 19 | 95 | 138 |
| | Spectra 70/45 | $23,000 | 11/65 | 96 | 19 | 115 | 76 |
| | Spectra 70/46 | $33,400 | 9/68 | 0 | 0 | 0 | 5 |
| | Spectra 70/55 | $33,300 | 11/66 | 11 | 0 | 11 | 16 |
| Raytheon | 250 | $1200 | 12/60 | 126 | 49 | 175 | X |
| | 440 | $3500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $3200 | 10/65 | 24 | 3 | 27 | 0 |
| Scientific Control Corp | 650 | $500 | 5/66 | 26 | 2 | 28 | 2 |
| | 655 | $1800 | 10/66 | 32 | 0 | 32 | 40 |
| | 660 | $2000 | 10/65 | 4 | 0 | 4 | 0 |
| | 670 | $2600 | 5/66 | 1 | 0 | 1 | 0 |
| | 6700 | $30,000 | 10/68 | 0 | 0 | 0 | 1 |
| Scientific Data Systems | SDS-92 | $1500 | 4/65 | 125 | 6 | 131 | 2 |
| | SDS-910 | $2000 | 8/62 | 208 | 15 | 223 | 6 |
| | SDS-920 | $2900 | 9/62 | 182 | 8 | 190 | 5 |
| | SDS-925 | $3000 | 12/64 | 56 | 2 | 58 | 4 |
| | SDS-930 | $3400 | 6/64 | 220 | 25 | 245 | 10 |
| | SDS-940 | $12,000 | 4/66 | 28 | 0 | 28 | 19 |
| | SDS-9300 | $8500 | 11/64 | 33 | 2 | 35 | 2 |
| | Sigma 2 | $1000 | 12/66 | 100 | 10 | 110 | 180 |
| | Sigma 5 | $6000 | 8/67 | 24 | 8 | 32 | 60 |
| | Sigma 7 | $12,000 | 12/66 | 16 | 1 | 17 | 26 |
| Standard Computer Corp | IC6000 | $18,000 | 5/67 | 11 | 0 | 11 | 7 |
| | IC4000 | $10,000 | 8/68 | 0 | 0 | 0 | 1 |
| Systems Eng Labs | 810 | $1000 | 9/65 | 22 | 2 | 24 | X |
| | 810A | $900 | 8/66 | 81 | 9 | 90 | 16 |
| | 840 | $1400 | 11/65 | 4 | 0 | 4 | X |
| | 840A | $1400 | 8/66 | 60 | 1 | 61 | 16 |
| UNIVAC | I & II | $25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $21,000 | 8/62 | 78 | 13 | 91 | X |
| | File Computers | $15,000 | 8/56 | 10 | 0 | 10 | X |
| | SS 80, 90 & Step | $8000 | 8/58 | 108 | 74 | 182 | X |
| | 418 | $11,000 | 6/63 | 100 | 50 | 150 | 22 |
| | 490 Series | $30,000 | 12/61 | 190 | 30 | 220 | 38 |
| | 1004 | $1900 | 2/63 | 1880 | 1050 | 2930 | 10 |
| | 1005 | $2400 | 4/66 | 830 | 370 | 1200 | 95 |
| | 1050 | $8500 | 9/63 | 191 | 86 | 277 | 5 |
| | 1101-1105 | $35,000 | 12/50 | 7 | 0 | 7 | X |
| | 1107 | $57,000 | 10/62 | 20 | 8 | 28 | X |
| | 1108 | $68,000 | 9/65 | 89 | 33 | 122 | 98 |
| | 9200 | $1500 | 6/67 | 215 | 50 | 265 | 740 |
| | 9300 | $3400 | 9/67 | 107 | 33 | 140 | 565 |
| | 9400 | $7000 | 5/69 | 0 | 0 | 0 | 80 |
| | LARC | $135,000 | 5/60 | 2 | 0 | 2 | X |
| | | | TOTALS | 44,431 | 20,752 | 65,183 | 22,458 |

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.



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| NEW YORK STOCK EXCHANGE | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| Addressograph-Multigraph | 91 1/2 | 52 | 2217 | 88 1/8 | 72 | 74 3/8 | -13 1/8 | -15.00 |
| American R & D | 207 | 122 1/2 | 623 | 195 1/4 | 165 1/4 | 166 | -21 1/4 | -11.35 |
| Ampex Corp. | 37 1/8 | 26 1/2 | 2233 | 33 7/8 | 28 7/8 | 30 1/8 | -2 3/4 | -8.37 |
| Bunker-Ramo | 21 3/8 | 15 7/8 | 9308 | 20 1/2 | 16 5/8 | 17 | -1 1/2 | -8.11 |
| Burroughs | 220 3/8 | 157 | 3143 | 217 | 192 1/2 | 194 1/8 | -6 7/8 | -3.42 |
| Collins Radio | 101 1/8 | 56 | 1872 | 63 1/2 | 56 | 56 5/8 | -5 7/8 | -9.40 |
| Control Data | 174 | 95 1/8 | 6599 | 171 | 145 1/2 | 147 | -14 | -8.69 |
| Electronic Assoc. | 27 3/8 | 18 1/4 | 1569 | 22 | 18 1/2 | 18 5/8 | -2 5/8 | -12.35 |
| General Electric | 100 | 83 | 6496 | 88 3/4 | 83 | 83 3/4 | -1 3/4 | -2.05 |
| Honeywell | 139 3/4 | 89 3/8 | 2072 | 134 | 109 1/8 | 113 | -17 | -13.08 |
| IBM | 375 | 324 | 3316 | 365 | 332 | 332 | -26 | -7.26 |
| Inter. Tel. & Tel. | 59 3/4 | 44 7/8 | 5022 | 59 3/8 | 53 3/8 | 54 3/4 | -1 5/8 | -2.97 |
| Litton | 104 3/4 | 62 | 4595 | 84 | 72 1/8 | 72 7/8 | -7 7/8 | -9.75 |
| Memorex | 80 | 61 1/2 | 3136 | 74 | 61 1/2 | 67 | -10 1/8 | -13.12 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 1524 | 143 1/2 | 123 1/2 | 124 1/8 | -12 1/4 | -8.98 |
| RCA | 55 | 45 | 6434 | 48 3/8 | 45 3/4 | 46 1/2 | -7/8 | -1.84 |
| Raytheon | 54 | 34 3/4 | 4048 | 44 | 34 3/4 | 34 3/4 | -7 1/4 | -17.26 |
| Sanders | 66 1/2 | 41 3/4 | 2072 | 56 7/8 | 44 | 44 5/8 | -10 7/8 | -19.54 |
| Scientific Data | 117 1/2 | 86 1/4 | 2800 | 106 3/4 | 86 1/4 | 88 | -14 1/8 | -13.83 |
| SCM | 61 1/4 | 39 1/2 | 4112 | 47 3/4 | 40 1/4 | 40 7/8 | -5 1/8 | -11.14 |
| Singer | 88 7/8 | 62 3/4 | 3224 | 79 1/2 | 70 | 73 | -5 3/4 | -7.30 |
| Sperry Rand | 63 3/8 | 41 7/8 | 17616 | 52 3/4 | 43 7/8 | 45 1/4 | -5 3/4 | -11.27 |
| Teledyne | 143 7/8 | 90 1/8 | 5414 | 121 1/2 | 94 1/8 | 94 5/8 | -22 3/8 | -19.12 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | -9.47 | -10.22 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 66 1/4 | 42 | 244 | 60 | 53 3/4 | 53 3/4 | -2 | -3.58 |
| Cal Comp. | 53 1/4 | 26 3/4 | 2637 | 52 1/4 | 40 3/4 | 40 3/4 | -7 1/2 | -15.54. |
| Clary Corp. | 32 3/8 | 12 1/4 | 2155 | 32 3/8 | 25 1/8 | 25 5/8 | -2 3/8 | -8.48 |
| Computer Applications | 42 5/8 | 20 5/8 | 510 | 27 | 23 | 23 | -2 7/8 | -11.11 |
| Computer Sciences | 64 3/4 | 31 5/8 | 1339 | 64 3/4 | 53 1/4 | 53 3/8 | -7 1/8 | -11.59 |
| Computing and Software | 61 1/4 | 43 1/2 | 381 | 56 3/4 | 50 3/4 | 51 1/2 | -2 | -3.73 |
| Data Proc. Fin. & Gen. | 184 | 94 | 3326 | 137 1/2 | 106 | 107 1/2 | -24 7/8 | -18.79 |
| Digital Equipment | 160 | 95 1/4 | 369 | 150 | 135 1/2 | 137 | -7 3/4 | -5.35 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 282 | 41 1/2 | 37 1/4 | 38 1/4 | -1 3/8 | -3.47 |
| Greyhound Comp. | 43 1/4 | 27 1/8 | 1469 | 40 1/2 | 31 7/8 | 32 1/2 | -12 3/4 | -33.17 |
| Granite Computer Leasing | 58 7/8 | 44 | 786 | 58 7/8 | 47 5/8 | 48 1/4 | -10 1/4 | -22.65 |
| Leasco | 114 3/4 | 70 3/4 | 3516 | 114 3/4 | 85 3/4 | 90 | -7 | -7.22 |
| +Levin-Townsend Comp. Corp. | 58 | 49 3/8 | 3285 | 58 | 49 3/8 | 50 | -6 3/4 | -11.89 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 1039 | 52 1/2 | 38 | 38 | -12 3/4 | -25.12 |
| Mohawk Data Sciences | 222 | 108 | 2739 | 222 | 164 | 164 1/4 | -43 3/4 | -21.03 |
| Planning Research | 45 1/4 | 28 | 638 | 44 | 36 5/8 | 37 1/8 | -3 7/8 | -9.45 |
| Potter Instrument | 38 1/2 | 20 1/2 | 1282 | 34 1/4 | 27 | 27 7/8 | -5 5/8 | -16.79 |
| Randolph Computers | 64 | 34 5/8 | 1624 | 56 7/8 | 44 1/4 | 47 1/8 | -7 1/8 | -13.13 |
| System Eng. Lab. | 42 5/8 | 31 1/8 | | | | 32 5/8 | -5 7/8 | -15.26 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | -9.14 | -13.54 |

+Split

| OVER-THE-COUNTER | 1968 High Bid | 1968 Low Bid | July 26 Bid | July 26 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 33 1/2 | 14 1/2 | 29 1/2 | 31 1/2 | 27 | +2 1/2 | +9.21 |
| Aries Corp. | 24 | 15 1/2 | 16 1/4 | 17 1/4 | 19 | -2 3/4 | -14.46 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 16 | 18 1/4 | 19 1/4 | 18 1/4 | -- | -- |
| Computer Usage | 62 | 32 | 32 | 33 1/2 | 39 1/2 | -7 1/2 | -18.92 |
| Cyber-tronics | 19 | 11 1/2 | 14 3/4 | 15 1/2 | 15 3/4 | -1 | -6.34 |
| Data Products | 22 | 13 | 17 5/8 | 18 | 20 | -2 3/8 | -11.83 |
| Digitronics | 27 1/2 | 16 1/2 | 19 1/4 | 20 1/4 | 24 | -4 3/4 | -19.70 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 18 5/8 | 19 1/8 | 19 1/2 | -7/8 | -4.48 |
| Electronic Memories | 57 1/2 | 32 3/4 | 37 | 38 1/2 | 42 | -5 | -11.90 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 15 | 15 1/2 | 17 | -2 | -11.76 |
| Informatics, Inc. | 68 | 32 | 59 | 61 | 61 | -2 | -3.25 |
| LMC Data, Inc. | 16 | 7 | 8 3/4 | 9 1/2 | 10 1/4 | -1 1/2 | -14.62 |
| Management Assistance | 16 1/8 | 10 | 10 3/4 | 11 1/8 | 11 3/8 | -5/8 | -5.49 |
| Optical Scanning Corp. | 138 | 71 | 97 | 103 | 117 | -10 | -8.54 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 86 1/2 | 88 1/2 | 80 1/2 | -6 | -7.45 |
| Standard Computers | 55 | 30 | 42 1/2 | 44 1/2 | 50 | -7 1/2 | -15.00 |
| Tally Corp. | 51 1/2 | 35 | 43 | 45 | 45 1/2 | -2 1/2 | -5.49 |
| TBS Computer Ctrs. Corp. | 21 3/4 | 12 1/4 | 14 1/4 | 15 1/4 | 12 1/4 | +2 | +16.31 |
| University Computing | 158 | 57 | 129 | 134 | 137 | -8 | -5.84 |



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EDP industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 29,1968 • VOL.4,NO.2 P.J.McGOVERN,EDITOR

Special Report

## BUSINESS OPPORTUNITIES GROWING FAST FOR COMPUTERS AND SERVICES THAT PROVIDE REMOTE ACCESS/IMMEDIATE RESPONSE CAPABILITIES

For several years, computer buffs have predicted that time sharing, on-line/real-time systems, remote computing -- whatever you want to call it -- would be the "coming thing" in computer utilization. Finally, during the past year or so, the "thing" has "come."

In preparing this report, EDP/IR has examined all aspects of this "thing," and in reporting on it has decided, first, to define and name it. This issue of EDP/IR will take a careful look at computer use involving remote access and immediate response . . . RAIR (pronounced like hair) computing.

This definition is not so restrictive as what purists call conversational time sharing; it is not so broad as to include all computer service that involves communications. RAIR systems and services constitute a cohesive subset within the computer industry . . . a portion of the industry that will involve some 75% of all installed systems by 1975.

We do not coin a word lightly . . . indeed, we are the first to admit that there are far too many acronyms appearing on the scene each day. But there is no existing phrase that adequately describes the important and identifiable segment of the computer marketplace that we wish to discuss. Here are some significant facts about the market for remote access/immediate response computing:

- During 1968, EDP/IR estimates, about $100 million will be paid to service organizations for instantaneous, remote access to their computers . . . for RAIR services.
- New companies that offer these services are being formed virtually every few days, with the current count at 70 or more.
- Over $1.5 billion of the computer equipment shipped to organizations in the U.S. this year will, in all probability, be used for RAIR service during its operating lifetime.

There are definite reasons for the present growth in demand for RAIR services. Efforts of pioneering organizations have whetted user appetites, and with today's equipment, at least limited or specialized RAIR service can be provided adequately and economically. Thus, more people offer services, and more organizations set up internal services of their own. RAIR computing has come of age.

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Market for RAIR equipment and services

In examining the potential market for remote access/immediate response computers and services, EDP/IR has talked with almost all the experts in the field. Also, about nine months ago, we conducted an extensive survey of present and prospective users of this type equipment or service. Recently, with the help of the research staff of the International Data Corporation, which publishes EDP/IR, we have updated this survey information. Using this information as a statistical sample, we applied it to IDC's continuing analysis of the computer industry, and developed certain market projections (see table, below). This information represents the best estimates currently available:

Total Computer Shipments, for the U.S., represent our mid-year revision of the figures published in the Review and Forecast issue (EDP/IR Jan.26,1968). The upward revision reflects the increased shipment rate for 1968, and the continuing prognosis that third-generation machines will gradually become transition generation systems, with no distinct "fourth generation" families on the horizon.

Shipments of RAIR Computers, to U.S. customers, have been calculated from IDC's growth-rate projections of various types of equipment. From the survey, sizes and types of computers being used in RAIR systems were determined, and each was assigned a probability of use in a RAIR system. These, then, were projected according to EDP/IR's anticipated growth rate (or decline) for various types of computer systems over the next five years.

Shipments of Remote Terminal Equipment, within the U.S., gives a good fix on the amount of RAIR computing to be expected from in-house systems and service organizations. This column includes everything from typewriter-like terminals to very sophisticated graphic displays that are used with commercial data processing systems. The figures were arrived at by careful time analysis of IDC's Domestic Computer Installation Data File, and they agree comfortably with estimates that have recently been made by other sources.

Amount Paid for RAIR Services includes only payments to service organizations. It does not include terminal rentals or communications charges.

PROJECTED VALUE OF EQUIPMENT SHIPPED, AND PAYMENTS TO SERVICE ORGANIZATIONS, FOR REMOTE ACCESS/IMMEDIATE RESPONSE (RAIR) COMPUTING IN THE UNITED STATES
(All figures in $ Millions)

| Year | Total Computer Shipments | Shipments of RAIR Computers | Shipments of Remote Terminal Equipment | Amount Paid for RAIR Services |
|---|---|---|---|---|
| 1967 | $ 3900 | $ 1000 | $ 235 | $ 50 |
| 1968 | 4500 | 1600 | 335 | 100 |
| 1969 | 5000 | 2200 | 450 | 180 |
| 1970 | $ 5600 | $ 2800 | $ 590 | $ 300 |
| 1971 | 6300 | 3500 | 800 | 500 |
| 1972 | 7000 | 4200 | 1100 | 900 |



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The equipment

The primary reason for what could be called an upsurge in remote access/immediate response computing is that quite a bit of equipment -- available today -- can handle a wide variety of jobs . . . economically. Much of this equipment has been in limited use for two or three years, and people have had a chance to experiment with different types of RAIR service that can be offered with it. And this type of experimentation can be addictive: Usually, a person who uses RAIR service for any amount of time wants to continue with it.

Quite a few educational and scientific institutions have been operating RAIR systems of some sort for the last three or four years. These, however, are usually operated with specially designed systems and involve many esoteric software usages. Most computer manufacturers, on the other hand, have current product lines that are suited for RAIR computing and that are being acquired for this purpose. This equipment is supplied both to the service organization that wishes to sell RAIR service and to the company or other organization that wants an in-house system for its own use. Here is a rundown, by manufacturer, of the equipment most often used today for remote access/immediate response computing:

Burroughs. In quite a few installations, the B-5500 is being used for RAIR computing. As larger members of the 500 family -- the 6500, 7500, and super 8500 computers -- are delivered, Burroughs may find itself one of the leaders in supplying equipment for RAIR computing services.

Control Data Corp. Several of the CDC 6000 series computers are being used to supply RAIR computing service to their owners, and one service organization -- as well as some companies -- uses the 3300 for such applications. Indeed, most of the newer 3000 series machines, as well as those in the 6000 series, can provide some form of RAIR service.

Digital Equipment Corp. The first computer designed specifically for time sharing, the PDP-6, was built by DEC. This machine, and the PDP-10, a microelectronic version, is being used in quite a few in-house applications as well as by some service organizations. Recently, DEC announced the TIME SHARE-8, a system built around the PDP-8/I, which is the lowest cost system presently available for RAIR computing and may well prove popular for engineering departments of large companies. DEC's PDP-1 was one of the first time-shared systems . . . actually the prototype for the PDP-6. And the service organization which pioneered with this machine currently uses PDP-7s to supply RAIR service to customers.

Hewlett Packard. This company has come up with its HP 2000A time-sharing system, and offers it as a reasonably inexpensive computer for in-house RAIR systems. It works best in applications where a single language is used. In addition, at least one service organization has already ordered several of the computers, and plans to develop specialized software languages, then sell RAIR service to educational, scientific, and general business users.

General Electric. This company pioneered in wide-scale marketing of RAIR service with its 265, a 235 and Datanet 30 combination that was developed by Dartmouth College to give students and faculty widespread use of the computer. Currently, the company operates 34 of these systems in the U.S. and a couple abroad. GE is also operating a larger machine, the 635, to provide more powerful RAIR service to its customers; the initial work with this machine for RAIR operations, again, was developed in conjunction with Dartmouth.



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GE has supplied 265s to at least five independent service organizations, but currently is pushing a new series -- the 420, 430, and 440 -- as the computer it sells for RAIR service. Currently, three service organizations use the 420 -- a 415/Datanet 30 combination -- to provide customers with remote computing. GE has also supplied large 645 systems to Bell Telephone Labs and Project MAC, and is working with these groups to develop the MULTICS system, still a research project.

Honeywell. One service organization is using a 2200 in its remote computing setup, but not until the 8200 is out and inoperation will Honeywell really have a machine adequate for extensive RAIR service. Internally, the company has set up a conversational time-sharing system built from two DDP-516s and a DDP-416. Also, Honeywell has built a special, mobile, race-track betting system, for the New York Racing Authority, composed of three H-200s.

IBM. Most of the RAIR services sold by IBM are still being operated on second-generation equipment: Datatext, a text-editing service, on the 1460, and Quiktran, an on-line Fortran computation service, on the 7044. It has just begun service with CALL/360 Basic, a time-sharing system which will give users remote access to a 360/50. Several service organizations use the 360/50 as their central processor, and a few use the 40 or 44. Quite a few companies are using the 360/65 to provide RAIR service, and this machine is being put into use by ITT in its nationwide service. IBM's computer designed for RAIR computing -- the 360/67 -- is operating at some installation, but most customers who have it installed are still using it as a 65, since the software for using it as designed has been delayed.

NCR. In several different locations, the NCR-315 is being used as the heart of an immediate response remote banking system. In addition, the company's Century 400, which hasn't been announced, is said to be a member of the family designed for RAIR computing.

RCA. The company's primary entry into RAIR processing will be through its Spectra 70/46. This computer is being marketed heavily for intra-company use, and also is to be used by at least one service organization.

Scientific Data Systems. The SDS 940, designed specifically for time sharing, is being used by a large number of service organizations that offer RAIR service. In addition, customers are using it for internal systems, and SDS is using it for both internal purposes and as the central processor for outside service. Some users are satisfied with the software offered by SDS; others have written their own. A less expensive version of the machine, the SDS 945, was announced during the summer, and is designed for in-house systems. In addition to these computers, SDS offers time-sharing software for its Sigma 5 and 7 computers.

Standard Computer Corp. Delivering what it calls the first of the "fourth generation" computers, SCC is about to deliver a computer system designed especially for a nationwide RAIR service organization. SCC computers have a very modular design, and the company says it can deliver advanced hardware that easily can adapt to any organization's software requirements.

Univac. Two of the largest independent RAIR systems currently being implemented -- those of University Computing and Computer Sciences Corp. -- have been designed around the Univac 1108. Many large in-house systems have been built around the same machine, and Univac offers a service pegged to the 1108 coupled to its 418. In addition, the company's 491 and 494 are being used for RAIR services. Thus, Univac is in good position for supplying large machines for RAIR service.



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What is a RAIR system?

RAIR computing, as we pointed out earlier, involves the use of a computer in providing remote access/immediate response computing. Many of the ideas behind such systems came out of the Air Force's Sage System, developed to a large extent by the Cambridge, Mass. technical community that orbits around the Massachusetts Institute of Technology. In 1959 and 1960, technical papers by members of this community talked about the advantages of such a system, and by the early 1960s, prototype systems were demonstrated.

One member of this community who was deeply involved in the early papers and experimentation was J.C.R. Licklider, who went to work at the Advanced Research Projects Agency and was able to secure funding for several experimental systems, including the largest and most famous -- Project MAC at MIT. MAC is a double-barreled acronym which stands for Multiple-Access Computing and Machine-Aided Cognition. The project is still looking at the future of RAIR computing, and just this summer Dr. Licklider -- after leaving the Government to work several years with IBM -- was appointed to head up Project MAC.

During the period when MAC was developing its time-sharing system, a commercial system was begun by Cambridge's Bolt, Beranek & Newman -- where Licklider had worked when his papers were prepared. Also, experimental work was begun by Dartmouth College, which put together a campus system based on two off-the-shelf GE products -- the 235 and the Datanet 30. Other experimental work was going on at the Rand Corp. and at System Development Corp., where a project was also sponsored by ARPA. From these beginnings, most of the computational types of RAIR systems have evolved.

A completely separate development which was being carried out, also, during the early 1960s, was the Sabre system, developed by IBM for American Airlines. This giant reservation system led the way for many types of reservation systems going into use today, and these are considered to be RAIR services. Another example, quite similar in principle, is the stock market quotation service.

RAIR computing, actually, includes most types of communications-oriented computing in which personal interaction is involved . . . except for remote batch computation. In this type service, a user loads his job at a remote terminal, the information goes to a central computer over communications lines, and the results are fed back to the terminal, usually a card reader/line printer combination. Except for the fact that it uses communications lines, this type computer operation is exactly like that done in a "normal" computer center, and we consider it not to fit into the RAIR picture, because there is no interaction. This type of computing, however, will be of growing importance, and may well capture some computational customers who otherwise would have had to have their own computer.

Types of organizations offering RAIR service

At present, most RAIR services offered by service organizations could be considered a form of conversational time sharing . . . since most of them provide for the remote writing and running of programs in one or more of the languages popular today. The same types of systems are being set up on an in-house basis by many large companies, universities, and other organizations.

The major computer manufacturers, naturally, are looking to RAIR computing not only as a source of equipment sales but also as a new business opportunity.



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The leader in this field, to date, is General Electric. Initially, one of its military departments in Valley Forge, Pa., adapted the Dartmouth system for its own engineering use, then found that it could sell service outside as well. This service operation has now been transferred to the Information Systems Division, which currently operates about half the RAIR computing systems in use at service organizations. Having begun selling service from 265 systems, it now offers service on larger 635s.

Among the other manufacturers, IBM certainly has the lead. Having offered its Quiktran and Datatext services for several years, the industry giant has recently introduced CALL/360 BASIC and CALL/360 DATATEXT, third-generation versions of the two original systems. Obviously, IBM has the muscle to move heavily into the RAIR market if it desires, and only time will tell whether it decides to do so. It has already been accused of unfair pricing by a service organization which offers RAIR service on IBM equipment. Another deterrent to IBM's making too strong a move in this direction could be the Justice Department, which conceivably could consider this type operation as a violation of the 1956 Consent Decree under which the Service Bureau Corp. was set up.

Univac has originated a service -- using 1004 terminals and a 418/1108 central processing setup -- which borders on being a RAIR operation. At present, it consists of very rapid remote batch processing, but it has the capability of providing RAIR service as well. Control Data, especially through its C-E-I-R subsidiary, is definitely entering the RAIR arena. Some of NCR's service bureaus offer RAIR service to banks; SDS -- in addition to selling computers to quite a few of the independent organizations -- is operating several RAIR services.

Definitely in the race for the RAIR market are the older, more established time-sharing companies such as Keydata (about the only organization to offer commercial, as opposed to computational, RAIR service), Allen-Babcock, Bolt, Beranek & Newman, Com-Share, Dial Data, and Tymshare. Many other companies, which "intend" to offer RAIR service, are being formed with great regularity, and it is hard to say, at this point, if they can be successful in competing with the large companies and the established service organizations.

Other types of large companies entering the RAIR market include information companies and compu-glomerates. University Computing (EDP/IR Dec.7,1967) is setting up its "multi-national computer utility;" Computer Sciences Corp. has announced plans to establish a "20-city, $50 million nationwide system of regional time-sharing computer centers," and ITT is starting up its "Reactive Terminal Service" in a new city every month or two.

Companies from completely outside the information processing industry are entering the RAIR race, as well. Call-A-Computer, the service organization owned by Pillsbury and Occidental Life, currently operates a GE 265 and placed the special order with Standard Computer Corp. to handle a nationwide operation. Lever Brothers has announced that it is investigating various computer service areas. McDonald-Douglas and Avco -- both large computer users -- are moving in the direction of offering RAIR service, as are many service bureaus. There's no telling where the proliferation will stop before consolidation sets in.

How is a RAIR service used?

In our surveys of RAIR service users, EDP/IR sought and received replies from both those who have in-house systems and those who subscribe to outside services.



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The sample was weighted to provide information from users of RAIR service, and 60% of the 125 replies were from users. Most of the commercial services and available computers were represented. Here are some of the more useful conclusions:

- System use. Of all the respondees who have in-house systems, the average system use for RAIR computing is 53%. Excluding the dedicated systems, the average is 32%.

- Cost of service. Since the survey purposely included several large users of RAIR services, the average cost reported was $6,000/mo. Excluding the largest users (those above $10,000/mo.), the average expenditure is $3500/mo. and the median about $2500/mo., including line charges. For these, the average number of terminal hours used each month is about 130.

- Applications. About 60% of the respondees used RAIR service more than half the time for engineering and research. In terms of projected future use, the applications where most growth is anticipated are management information, finance, and plant operations.

- Terminals. Of all users surveyed, the average number of terminals used was 15 per organization. Excluding those users with more than 30 terminals, the average is 10 terminals and the median is 6.

- Control. The question of terminal authorization is one of the major ones being asked today. In the survey, those organizations with in-house RAIR systems reported that 62% of the terminals were under the supervision of a data processing manager. Where RAIR service is purchased from a service organization, only 32% of the respondees reported that terminals are under the supervision of a DP manager. Almost all of the remaining 68% were supervised by the user himself or by a senior in his own department.

- Languages. Most respondees reported using more than one language -- either from the same service, or from different services. Fortran received the most mentions with 29%, and Basic was second with 20%.

## The outlook

RAIR computing is here to stay . . . but its marketplace stature may change significantly over the next few years.

Service organizations are beginning to use several techniques to give added reliability and economy: message concentrators provide local service to cities without computers; duplication of systems gives backup and lower software costs; interconnections allow a mix of services to be offered within one RAIR service framework. These actions will tend to provide greater reliability and will be a force toward compatibility and continued computer "family" organization.

On the other hand, users with in-house systems may begin selling RAIR service competitively, and manufacturers, through economies of scale, may begin to force marginal organizations to either band together or go out of business. All in all, EDP/IR sees RAIR computing becoming a major segment of the computer industry, and we predict that costs for this service will soon come spiralling down.

-- James Peacock, Managing Editor



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| | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 1/2 | 52 | 1916 | 74 3/4 | 71 | 74 1/2 | +1/8 | +0.17 |
| American R & D | 207 | 122 1/2 | 437 | 170 | 160 1/2 | 165 1/2 | -1/2 | -0.30 |
| Ampex Corp. | 37 1/8 | 26 1/2 | 1053 | 30 | 28 1/4 | 29 | -1 1/8 | -3.88 |
| Bunker-Ramo | 63 1/8 | 47 | 4675 | 17 3/4 | 15 3/4 | 16 5/8 | -3/8 | -2.21 |
| Burroughs | 220 3/8 | 157 | 2199 | 199 7/8 | 189 | 197 1/2 | +3 1/4 | +1.67 |
| Collins Radio | 101 1/8 | 53 | 671 | 57 1/4 | 53 | 54 1/8 | -2 1/2 | -4.42 |
| Control Data | 174 | 95 1/8 | 3629 | 149 1/4 | 140 1/4 | 149 1/4 | +2 1/4 | +1.53 |
| Electronic Assoc. | 27 3/8 | 18 | 571 | 20 1/4 | 18 | 18 3/4 | +1/8 | +0.67 |
| General Electric | 100 | 80 1/4 | 3083 | 84 1/2 | 80 1/4 | 81 1/2 | -2 1/4 | -2.68 |
| Honeywell | 139 3/4 | 89 3/8 | 914 | 119 7/8 | 110 | 117 5/8 | +4 5/8 | +4.09 |
| IBM | 375 | 324 | 2569 | 344 | 326 | 335 | +3 | +0.90 |
| Inter. Tel & Tel | 59 3/4 | 44 7/8 | 2333 | 55 | 52 1/4 | 54 3/4 | --- | --- |
| Litton | 104 3/4 | 62 | 2162 | 75 3/4 | 69 3/8 | 70 5/8 | -2 1/4 | -3.09 |
| Memorex | 80 | 61 1/2 | 2490 | 75 5/8 | 67 1/4 | 73 | +6 | +8.95 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 706 | 127 3/4 | 123 1/8 | 126 1/2 | +2 3/8 | +1.91 |
| RCA | 55 | 44 1/4 | 3510 | 46 1/2 | 44 1/4 | 45 7/8 | -5/8 | -1.34 |
| Raytheon | 54 | 33 1/4 | 2059 | 36 3/4 | 33 1/4 | 35 1/2 | +3/4 | +2.16 |
| Sanders | 66 1/2 | 41 3/4 | 1292 | 47 5/8 | 43 1/8 | 46 3/8 | +1 3/4 | +3.92 |
| Scientific Data | 117 1/2 | 85 5/8 | 2585 | 94 7/8 | 85 5/8 | 89 | +1 | +1.13 |
| SCM | 61 1/4 | 37 1/4 | 1973 | 41 3/8 | 37 1/4 | 38 1/2 | -2 3/8 | -5.81 |
| Singer | 88 7/8 | 62 3/4 | 1756 | 75 1/4 | 69 1/4 | 71 | -2 | -2.74 |
| Sperry Rand | 63 3/8 | 41 7/8 | 6799 | 46 3/8 | 43 | 44 | -1 1/4 | -2.76 |
| Teledyne | 143 7/8 | 90 1/8 | 2493 | 96 3/8 | 90 1/2 | 95 1/4 | +5/8 | +6.61 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | +0.48 | +0.19 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 66 1/4 | 42 | 173 | 54 | 49 5/8 | 50 1/8 | -3 5/8 | -6.74 |
| Cal Comp. | 53 1/4 | 26 3/4 | 1258 | 40 7/8 | 36 1/2 | 37 | -3 3/4 | -9.20 |
| Clary Corp. | 32 3/8 | 12 1/4 | 600 | 27 3/4 | 24 1/8 | 25 5/8 | --- | --- |
| Computer Applications | 42 5/8 | 20 5/8 | 267 | 23 7/8 | 22 1/4 | 22 1/4 | -3/4 | -3.26 |
| Computer Sciences | 64 3/4 | 31 5/8 | 1088 | 52 1/4 | 46 1/8 | 47 7/8 | -6 1/2 | -12.18 |
| Computing and Software | 61 1/4 | 43 1/2 | 236 | 55 3/8 | 51 | 53 7/8 | +2 3/8 | +4.61 |
| Data Proc. Fin. & Gen. | 184 | 94 | 1215 | 112 1/2 | 102 1/2 | 108 7/8 | +1 3/8 | +1.28 |
| Digital Equipment | 160 | 95 1/4 | 312 | 143 3/4 | 132 1/4 | 143 | +6 | +4.38 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 173 | 38 7/8 | 28 1/4 | 29 | -9 1/4 | -2.41 |
| Granite Computer Leasing | 58 7/8 | 44 | 354 | 55 1/4 | 46 3/4 | 52 1/4 | +4 | +8.29 |
| Greyhound Computer | 43 1/4 | 27 1/8 | 612 | 33 3/8 | 30 | 30 1/4 | -2 1/4 | -6.92 |
| Leasco | 114 3/4 | 70 3/4 | 2648 | 97 1/2 | 83 1/2 | 88 1/8 | -1 7/8 | -2.08 |
| Levin-Townsend Comp. Corp. | 58 | 47 5/8 | 1780 | 54 5/8 | 47 5/8 | 52 3/8 | +2 3/8 | +4.75 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 1023 | 37 1/2 | 31 1/2 | 34 | -4 | -10.53 |
| +Mohawk Data Sciences | 107 1/2 | 77 1/2 | 2084 | 87 7/8 | 77 1/2 | 83 | +7/8 | +1.07 |
| Planning Research | 45 1/4 | 28 | 202 | 39 3/8 | 35 1/2 | 38 | +7/8 | +2.36 |
| Potter Instrument | 38 1/2 | 20 1/2 | 387 | 30 | 26 3/4 | 28 7/8 | +1 | +3.59 |
| Randolph Computer Corp. | 64 | 34 5/8 | 690 | 47 5/8 | 42 | 44 1/2 | -2 5/8 | -5.57 |
| Systems Eng. Labs. | 42 5/8 | 30 | 675 | 32 3/4 | 30 | 31 1/2 | -1 1/8 | -3.45 |

+Stock Split

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| AMSE COMPUTER STOCK AVERAGE | | | | | | | -0.89 | -1.92 |

| OVER-THE-COUNTER | High Bid | Low Bid | August 9 Bid | August 9 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 33 1/2 | 14 1/2 | 27 | 29 | 27 | --- | --- |
| Aries Corp. | 24 | 15 1/2 | 19 | 20 | 16 1/2 | +2 1/2 | +15.15 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 16 | 17 1/4 | 18 1/4 | 17 1/4 | --- | --- |
| Computer Usage | 62 | 28 1/2 | 29 1/2 | 31 | 29 1/2 | --- | --- |
| Cyber-tronics | 19 | 11 1/2 | 13 1/4 | 14 | 13 3/8 | -1/8 | -0.93 |
| Data Products | 22 | 13 | 17 3/4 | 18 1/8 | 15 5/8 | +2 1/8 | +13.60 |
| Digitronics | 27 1/2 | 16 1/2 | 19 1/4 | 20 1/4 | 18 1/2 | +3/4 | +3.85 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 17 1/8 | 17 7/8 | 17 3/8 | -1/4 | -1.44 |
| Electronic Memories | 57 1/4 | 32 3/4 | 37 1/2 | 39 | 35 | +2 1/2 | +7.14 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 14 1/8 | 14 5/8 | 14 1/4 | -1/8 | -0.88 |
| Informatics, Inc. | 68 | 32 | 61 | ** | 59 | +2 | +3.39 |
| LMC Data, Inc. | 16 | 7 | 9 | 9 3/4 | 9 1/4 | -1/4 | -2.70 |
| Management Assistance | 16 1/8 | 10 | 10 5/8 | 11 | 10 5/8 | --- | --- |
| Optical Scanning Corp. | 138 | 71 | 94 | 98 | 100 | -6 | -6.00 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 85 | 87 | 83 1/2 | +1 1/2 | +1.79 |
| Standard Computers | 55 | 30 | 46 | 48 | 41 | +5 | +12.19 |
| Tally Corp. | 51 1/2 | 35 | 46 | 47 1/2 | 44 1/2 | +1 1/2 | +3.37 |
| TBS Computer Centers Corp. | 21 3/4 | 12 1/4 | 13 1/2 | 15 1/2 | 13 1/2 | --- | --- |
| University Computing | 158 | 57 | 130 | 135 | 130 | --- | --- |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 12,1968 • VOL.4,NO.3 P.J.McGOVERN,EDITOR

## NEW AT&T TARIFF ALLOWS MODEMS TO BE BUILT INTO TERMINALS AND CLEARS UP LEGALITIES OF USING ACOUSTIC COUPLERS

*. . . our intent is to make interfaces as simple and inexpensive as possible, and rules and limitations as few as good sense will allow . . . we want to minimize restraints, not multiply them. We want our services to expand, not restrict, opportunity for others. For it is this, we well know, that expands opportunity for us.*

That's what H.I. Romnes, chairman of AT&T, told the opening session of the Spring Joint Computer Conference in Atlantic City. He repeated the statement at the recent press conference at which his company explained a new tariff covering customer-owned terminal devices . . . a tariff that may have been planned all the time but that virtually was demanded by the Federal Communications Commission in its decision in the Carterfone case (EDP/IR,July 11,1968).

The new tariff was filed to be effective on November 1, 1968, but was expected to be delayed for some time because AT&T had petitioned for reconsideration in the Carterfone case. Acting with considerable speed, the FCC has denied the petition and now AT&T says that it is moving rapidly in filing the tariff so that it will be effective on the date planned. This new tariff has three major provisions, two of them important to the data processing market in general and to the growing Rair market (EDP/IR,Aug.29,1968) in particular. Here's a summary of what the tariff provides:

- Manufacturers may now build modulation/demodulation (modem) circuits into computer terminal equipment. Minimum standards must be met, of course, and the user of the equipment will be required to have a protective device -- which will cost him about $2 per month -- at the interface between the terminal and the telephone network.

- Acoustic or inductive connections are now included in the tariff, and so long as minimum standards are met, these couplers can be used without additional charge. Previously, the legality of using such devices was a cloudy issue, and actually was part of what brought the Carterfone case to the FCC.

- Private mobile radiotelephone systems can be connected to the telephone network through customer-provided acoustic or inductive devices. This specifically settles the issue raised in the Carterfone case, yet ironically is included in the tariff almost as an execption.

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Except for the provision about mobile radiotelephone systems, the tariff specifically does not provide for the connection -- through non-AT&T equipment -- of customer-provided communications systems or switchboards. This matter, the telephone company says, "involves serious and complex public-interest problems" and that these problems "require much more consideration and deeper exploration on the part of both industry and Commissions." The company is, it told the FCC in its application for the new tariffs described above, "pursuing the study of further possible changes in regulations relating to the connection of customer-provided communications systems."

Importance of the tariff

The provision for acoustic couplers will probably speed the acceptance of portable terminals. Salesmen for Rair (remote access/immediate response) computing systems already use them, and this use likely will increase. Also, in many organizations, there probably is a need for terminals that can be wheeled from office to office as needed, then connected with the desk telephone set.

And the provision in the tariff allowing built-in modems could mean a considerable savings to users of Rair services, since a $2 device will be replacing Data-Phones that cost the customer between $5 and $80 a month. The actual amount of the savings, of course, will depend on how much it costs the terminal manufacturer to build modems into his equipment, and how much of the savings he is willing to pass along to the customer.

The savings to the customer may not be as much as is anticipated. For example, General Electric's low-cost modem line, the DigiNet 100 series (EDP/IR,Nov.19, 1967), has models priced between $500 and $900. Amortizing these over, say, 50 months would give "average monthly rentals" between $10 and $18. Naturally, quantity prices on these would bring the price down, and if they were built along with a terminal, rather than packaged separately, they would cost less. But this comparison gives something to think about. As AT&T's president, Ben S. Gilmor, says, customers "can continue to use telephone company Data-Phone sets, if they desire."

In any event, the terminal manufacturer can supply the modem, now, if he desires. The standards are established. It is now up to various terminal manufacturers, pressed by the forces that operate in a competitive marketplace, to prove that they can supply an adequate product at a better price than Western Electric, AT&T's manufacturing subsidiary.

Potential for business

The market for remote terminal equipment is going to experience growth for the foreseeable future (EDP/IR,Aug.29,1968), going from an estimated $100 million this year to about $1 billion by 1972. And every one of these terminals that is providing Rair service will have a modem -- built-in or supplied by AT&T -- connected to it. The National Bureau of Standards has estimated that there will be 300,000 data terminal units in operation by 1972, so the market value of modems alone would be in the $50 million to $100 million range or more.

The size and growth potential of this market will definitely encourage new data terminal products from both small and large companies . . . old and new. These -- and the tariff -- hopefully will lower costs for the terminal user. And it is not expected to cut into AT&T's income. The AT&T chairman says that any losses in Data-Phone rentals should be more than offset by increased line usage.



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REMOTE TERMINALS MOVE INTO ON-LINE, COMPUTER-AIDED SERVICE BUSINESSES

One of the big frontiers where remote terminal use will multiply is in on-line information retrieval beginning to be offered by computer service companies. Already, commercial computer service bureaus are helping the public -- via terminals and telephone lines -- to buy a house, get a job, rent a car, line up a hotel room, book a theater ticket, or reserve a seat at sporting events from UCLA football games to the spring opener of the New York Mets.

Four new services, some now going operations and others about to go on-line, illustrate the trend:

- Theater and sports tickets are available in five major cities from two different systems -- Computicket, a subsidiary of Computer Sciences, in Los Angeles, and Ticket Reservation Service, in New York.

- Listings of houses for sale are on-line through a computer system operated in Detroit and seven other localities by Realtron, Inc.

- Hotel, motel, and car rental reservations are being offered by Telmax division of Maxson Electronics. And this fall, National Accomodations Reservations Service (NARS) will start a nationwide network with a projected 4,000 to 5,000 terminals.

- A broad-scale information retrieval utility is also opening this fall, with remote files on houses, jobs, and college data. Using franchises, the National Information Storage and Retrieval Centers (NISARC) expects to be nationwide in scope by 1970. At first, it will use the IBM Quiktran time-sharing system as its computer file.

Dozens of smaller, more specialized commercial services are springing up, and plans abound to set up "for-profit" remote access information service operations ranging from personal credit reports through on-line catalogs of industrial components to data banks of statistics on a variety of financial and business areas.

The prototypes for such systems, of course, are the airline, rent-a-car, and hotel reservations systems developed primarily for the convenience of customers and as a practical way to handle the soaring volume of travel . . . and the accompanying reservations and paperwork. These pioneers, however, were in-house systems, designed for service rather than for operating profits.

The new generation of reservation and information retrieval systems share many of the problems of the pioneers: They must access a large, remote file; pull out a few items of information; update the file; and provide some sort of response at the remote terminal. Little computation is done, but these services are part of the remote access/immediate response (Rair) market (EDP/IR,Aug.29,1968).

"Third-Generation" service systems

It is the burgeoning technology of Rair systems -- including time-sharing service bureaus -- that has made these new computerized service operations practical. Compared to pioneer systems, the new ones are "third generation" by definition:

Hardware used is third-generation processors combined with large memory systems, communications equipment, and reliable, low-cost terminals.



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Software relies on new programming techniques for handling communications messages, large files of information, and systems operation.

But more important, these new Rair service companies are banking on innovations in marketing strategy, financing, pricing, and service to bring success.

Broad markets are necessary for success, so new services are priced low to stimulate volume business. Motels on the NARS system, for example, will pay between 48¢ and 82¢ per reservation, with no cost for terminal equipment. In earlier independent systems, the $100 monthly rental for terminals discouraged expansion.

Tie-ins with big chains or organizations also help broaden the market. Realtron, for example, is partly owned by the Detroit Real Estate Board and has received the endorsement of the National Association of Real Estate Boards. Ticket Reservation Service has signed up several large sports arenas and some big theater chains, and Computicket has its first terminals located in chains of supermarkets, department stores, and music shops.

Volume business will stimulate more business as the network grows in size. NARS aims to go beyond room reservations to credit validation and hotel accounting and supplies services. And NISARC figures that its files on job opportunities will also stimulate business for a house listing file.

Simple, low-cost equipment will enable untrained workers to use the system, thus extending its operation to gas stations and corner stores. The ultimate in simplicity is the Touch Tone telephone now used in the Realtron system. The real estate agent simply touch-dials the service number followed by a code describing the desired house specifications. A voice-answerback system replies in spoken digits that indicate the proper page in a daily updated catalog of houses currently for sale.

## Problems and prognosis

There are still many problems for the new services to solve, although the new tariffs from AT&T (page 1) may help cut terminal costs. Marketing costs will be high, and maintenance will be a headache for motels far off the beaten track. And, then, systems will need backup to protect against system or file failures.

In the long run, though, the new services will probably have more trouble with the utility nature of their business than with the equipment. On the one hand, a proprietary position in one service field is the keystone of success. On the other, services in the reservation and retail information field will feel strong pressure to "get compatible" from airline, hotel, store, and banking customers . . . and to merge. The end result could be a nationwide information utility, with the strong possibility of government regulation.

One partial answer may come next year with the automated bridge between independent systems. Atar Computer Systems, Inc., will begin to link the airlines' individual reservation systems with a master interface which will include terminals for travel agents. Via Atars, agents will be able to book flights over several airlines at one time with a typewriter or CRT display. NARS, with $15 million in Burroughs computers and terminal equipment on order, plans a similar interface role between the big hotel and car rental systems. Can NARS meet Atars?



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## CZECH CRISIS MAY CAUSE U.S.-BRITISH COMPUTER TRADE RIFT

In the wake of the recent row in Czechoslovakia, many changes in export policy -- including those that affect computers -- can be expected. The U.S. Board of Trade almost certainly will re-evaluate its recently relaxed standards for the shipment of computer systems to Eastern Europe, and the hardening of the U.S. line will naturally affect computer sales for many computer manufacturers.

The biggest problem in deciding the Czech computer sweepstakes is presented to the British: U.K. companies have the greatest share of the Czech computer market; U.K. manufacturers are using U.S. patents -- the major exception being ICL's 1900 series machines. Any action by the U.S. Board of Trade, therefore, will have a significant effect on U.K. computer manufacturers, and this is becoming clear to them. Evidence of concern shows up in recent editorials in the British trade press. Consider the following, for example, published last week in Computer Weekly:

> *. . . this market* [Eastern Europe] *is of great value and important* [sic] *to Britain if this country is to avoid American domination . . .*
>
> *Whatever the political situation, the Communist countries desperately need computers and it may be that supplying them would be a significant action in defeating Communism. . .*
>
> *The greatest industrial danger continues to be from the U.S. It will not be at all surprising that, following the Czech events, the U.S. government looks closely at restrictions to be applied to exports to Communist countries.*
>
> *Such action will be against the interests of the U.K. industry and the government must be prepared to act, and if necessary to demand complete reshaping of the COCOM organization, which over the years has passed from being a Western strategical necessity to a hardly disguised attempt to control trade.*

As a matter of fact, the Czech crisis could not have occurred at a worse time as far as Western computer interests are concerned. Only recently has the Czech computer market developed to the point where profitable numbers of medium scale machines would be required. International Computers Ltd., for example has a permanent staff of 12, residing in Czechoslovakia, to service the company's 15 computer installations and, although the men are not salesmen, they keep an eye out for prospective new business.

In Czechoslovakia, the actual growth of the computer market since 1965 has not been nearly so impressive as the shift in its makeup. In 1965, some 30 to 40 small computers -- Elliott 803s, LGP-30s, Univac 1004s -- were installed. The first medium-sized systems -- NCR 315s and English Electric 326s -- were brought in about this time. Now, however, Czechoslovakia is building her own medium-sized systems such as the Telsa 200 (under license from General Electric) as well as installing other Western-built medium-sized machines.

The computers in Czechoslovakia, at the present, are used primarily by the government organizations and by large companies. To date, no university has a computer in the medium-scale range. But when the universities and the less-than-giant companies start to install computers, the British companies want to be on hand to go after this large market. It is rather doubtful that Britain will allow trade agreements with the U.S. to stand in her way.



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## NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

| | |
|---|---|
| COMPUTER COMMUNICATIONS INC. | Computer Communications Inc., 701 W. Manchester Blvd., Inglewood, Calif., a manufacturer of computer communication peripheral devices, filed on Aug. 2 some 200,000 capital shares. The proceeds at a price to be set by amendment (max. $12.50) will be used for debt repayment, expansion, and other corporate purposes. The underwriter is Blair & Co., Inc., 5 Hanover Sq., New York. |
| COM-SHARE, INC. | Com-Share, Inc., 1919 W. Stadium Blvd., Ann Arbor, Mich, a time-sharing service organization, filed on July 24 some 225,000 common, with warrants (10 per share needed) to purchase 22,500 additional shares, to be offered in units of one share and one warrant. Proceeds, at a price to be set by amendment (max. $25 per unit), will be used for equipment, debt repayment, and working capital. The underwriter is Rodman & Renshaw, 209 S. LaSalle St., Chicago. |
| COMPUTER CONSOLES, INC. | Computer Consoles, Inc., 317 Main St., East Rochester, N.Y., a manufacturer of communication computer related devices, filed on July 24 some 175,000 common. The proceeds, at $10 per share, will be used for equipment and working capital. No underwriter. |
| CYBER-TRONICS, INC. | Cyber-Tronics, Inc., 4 Nevada Dr., New Hyde Park, N.Y., which leases and sells data processing equipment, on July 25 filed some 700,000 common. The proceeds, at a price to be set by amendment (max $16) will be used for equipment. The underwriters are F.S. Smithers & Co., 45 Wall St., and Dominick and Dominick, Inc., 14 Wall St., New York. |
| COMPUTER CORP. | Computer Corp., New York City, a computer leasing company, on Aug. 30 filed 275,000 common. The proceeds, at a price to be set by amendment, will be used for working capital. The underwriters are Stone & Webster Securities Corp., 90 Broadway, and Lombard, Vitalles & Pagunucci, Inc., 111 Broadway, New York. |
| COMPUTER STUDIES, INC. | Computer Studies, Inc., 160 Broadway, New York, a company that operates computer programming schools, filed some 160,000 shares of common. Proceeds from the offering, max. $5 a share, will be used for expansion and other corporate purposes. The underwriter is Carter, Walker & Co., 45 Wall St., New York. |
| DIGITAL EQUIPMENT CORP. | Digital Equipment Corp., Maynard, Mass., manufacturer of digital computers and electronic modules, on July 29 filed 315,000 common, of which 100,000 are to be offered by the company and 215,000 by American Research & Development, the majority stockholder. The proceeds, at a price to be set by amendment, will be used for debt repayment and working capital. The underwriter is Lehman Brothers, One William St., New York. |



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| | |
|---|---|
| EDP RESOURCES | EDP Resources, 100 Park Ave., New York, a company that provides software to computer users, on Aug. 1 filed 300,000 common. The price will be set by amendment, and proceeds will be used for equipment and other corporate purposes. The underwriter is Dominick and Dominick, 14 Wall St., New York. |
| GLAMOUR COMPUTER, INC. | Glamour Computer, Inc., 55 West 42nd St., New York, a company that provides beauty counselling services to women, on Aug. 13 filed 100,000 common and 100,000 common purchase warrants, to be offered in units of 25 shares and 25 warrants. The proceeds, at $105 per unit, will be used for working capital. The underwriter is Dunhill Securities Corp., 21 West St., New York. |
| INFOTEC, INC. | Infotec, Inc., 22 Purchase St., Rye, New York, a company that manufacturers digital communications and computer peripheral devices, on July 17 filed 250,000 shares of common. The proceeds, at a price to be set by amendment (max. $5), will be used for equipment, expansion, and working capital. The underwriter is the First Investment Planning Co., 1500 Mass. Ave. N.W., Washington, D.C. |
| KPA COMPUTER TECHNIQUES, INC. | KPA Computer Techniques, Inc., Lincoln Bank Bldg., Large, Pa., a company that offers a computer-oriented problem solving service, on Aug. 27 filed 160,000 common. The proceeds, at $6 per share, will be used for expansion, equipment, and working capital. The underwriter is Kern Securities Corp., Rm. 2120, 111 Broadway, N.Y. |
| LMC DATA, INC. | LMC Data, Inc., 116 E. 27th St., New York, a company that leases used data processing equipment, on Aug. 27 filed $4 million of convertible subordinated debentures due 1983. The proceeds, at $500 per debenture, will be used for expansion, debt repayment, and equipment. The underwriter has yet to be named. |
| PRINCETON TIME SHARING SERVICES, INC. | Princeton Time Sharing Services, Inc., Alexander Rd., Princeton, N.J., a company that sells time-sharing services, on Aug. 14 filed 150,000 common and 75,000 common purchase warrants to be offered in units of one share and one-half warrant, at $6 per unit, with proceeds to be used for working capital. The underwirter is Mayflower Securities Co., 32 Broadway, New York. |
| ROWAN COMPUTER & EQUIPMENT LEASING CORP. | Rowan Computer & Equipment Leasing Corp., 610 Sunrise Hwy, Baldwin, N.Y., a company that leases computer equipment and provides computer information services, on Aug. 13 filed 308,000 common with warrants attached to purchase an additional 308,000 shares, to be offered in units of one share and one warrant. The proceeds, at $6 per unit, will be used for equipment and working capital. Underwriter is D.H. Thomas & Co., 54 Wall St., New York. |
| SCIENTIFIC CONTROL CORP. | Scientific Control Corp., 14008 Distribution Way, Dallas, Texas, a manufacturer of general purpose computers and data processing equipment, on Aug. 19 filed 382 common shares, of which 182,000 are to be offered by the company and 200,000 by a selling stockholder. The proceeds, at a price to be set by amendment (max. $8), will be used for working capital. The underwriters are H.L. Federman & Co., 50 Broadway, New York, and Kleiner, Bell & Co., 9756 Wilshire Blvd., Beverly Hills, Calif. |



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| NEW YORK STOCK EXCHANGE | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| Addressograph-Multigraph | 91 1/2 | 52 | 1032 | 83 3/8 | 76 1/4 | 80 1/4 | +5 3/4 | +7.72 |
| American R & D | 207 | 122 1/2 | 278 | 171 1/2 | 164 | 164 | -1 1/2 | -0.91 |
| Ampex Corp. | 37 1/8 | 26 1/2 | 1352 | 32 1/4 | 28 3/4 | 32 | +3 | +10.34 |
| Bunker Ramo | 21 3/8 | 15 3/4 | 2992 | 17 1/4 | 16 | 16 3/4 | +1/8 | +0.75 |
| Burroughs | 220 3/8 | 157 | 1583 | 213 7/8 | 199 1/2 | 208 1/4 | +10 3/4 | +5.44 |
| Collins Radio | 101 1/8 | 53 | 787 | 57 7/8 | 54 | 57 5/8 | +3 1/2 | +6.47 |
| Control Data | 156 | 126 3/4 | 16,090 | 156 | 126 3/4 | 128 | -21 1/4 | -14.24 |
| Electronic Assoc. | 27 3/8 | 18 | 766 | 22 | 18 3/4 | 19 1/2 | +3/4 | +3.85 |
| General Electric | 100 | 80 1/4 | 2602 | 83 1/2 | 81 | 83 1/4 | +1 3/4 | +2.15 |
| Honeywell | 139 3/4 | 89 3/8 | 1110 | 124 | 114 1/2 | 114 1/2 | -3 1/8 | -2.66 |
| IBM | 375 | 324 | 1457 | 346 1/2 | 335 1/4 | 338 1/4 | +3 1/4 | +0.97 |
| ITT | 59 3/4 | 44 7/8 | 2125 | 56 1/2 | 54 5/8 | 56 | +1 1/4 | +2.28 |
| Litton | 104 3/4 | 62 | 1522 | 73 7/8 | 70 1/8 | 71 3/4 | +1 1/8 | +1.59 |
| Memorex | 80 | 61 1/2 | 979 | 76 | 71 | 72 1/2 | +1/2 | +0.69 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 576 | 130 3/4 | 125 1/2 | 127 | +1/2 | +0.39 |
| RCA | 55 | 44 1/4 | 2389 | 49 | 46 | 47 1/4 | +1 3/8 | +2.99 |
| Raytheon | 54 | 33 1/4 | 4514 | 38 5/8 | 35 | 38 3/8 | +2 7/8 | +8.10 |
| Sanders | 66 1/2 | 41 3/4 | 455 | 48 1/4 | 45 1/8 | 47 1/4 | +7/8 | +1.89 |
| Scientific Data | 117 1/2 | 85 5/8 | 1954 | 97 3/4 | 89 3/4 | 91 1/2 | +2 1/2 | +2.81 |
| SCM | 61 1/4 | 37 1/4 | 1697 | 40 3/4 | 37 5/8 | 37 5/8 | +7/8 | +2.27 |
| Singer | 88 7/8 | 62 3/4 | 1077 | 73 3/4 | 70 | 73 | +2 | - - |
| Sperry Rand | 63 3/8 | 41 7/8 | 4671 | 47 7/8 | 44 1/4 | 46 | +2 | +4.67 |
| Teledyne | 143 7/8 | 90 1/8 | 2102 | 97 7/8 | 91 1/4 | 96 7/8 | +1 5/8 | +1.71 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | +.79 | +2.14 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 66 1/4 | 42 | 161 | 58 1/2 | 50 5/8 | 56 1/4 | +6 1/8 | +12.22 |
| Cal Comp. | 53 1/4 | 26 3/4 | 711 | 38 7/8 | 34 1/4 | 35 5/8 | -1 3/8 | -3.72 |
| Clary Corp. | 32 3/8 | 12 1/4 | 546 | 27 | 23 1/2 | 23 5/8 | -2 | -7.80 |
| Computer Applications | 42 5/8 | 20 5/8 | 280 | 22 7/8 | 21 1/8 | 21 3/8 | -7/8 | -3.93 |
| Computer Sciences | 64 3/4 | 31 5/8 | 614 | 51 7/8 | 44 1/4 | 44 1/4 | -3 5/8 | -7.57 |
| Computing and Software | 61 1/4 | 43 1/2 | 136 | 54 | 52 1/2 | 53 7/8 | - - | - - |
| Data Proc. Fin. & Gen. | 184 | 88 | 2655 | 111 3/8 | 88 | 88 1/2 | -20 3/8 | -18.71 |
| Digital Equipment | 160 | 95 1/4 | 447 | 145 | 135 | 137 | -6 | -4.20 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 208 | 32 1/4 | 27 1/4 | 27 3/4 | -1 1/4 | -4.31 |
| Granite Computer Leasing | 58 7/8 | 44 | 395 | 53 3/4 | 45 1/2 | 47 1/4 | -5 | -9.60 |
| Greyhound Computer | 43 1/4 | 27 1/8 | 533 | 31 1/2 | 28 | 28 1/2 | -1 3/4 | -5.79 |
| Leasco | 114 3/4 | 70 3/4 | 2772 | 99 1/4 | 85 | 95 1/8 | +7 | +7.94 |
| Levin-Townsend Comp. Corp. | 58 | 47 5/8 | 1457 | 56 7/8 | 50 7/8 | 51 1/2 | -7/8 | -1.67 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 574 | 43 5/8 | 34 1/4 | 41 7/8 | +7 7/8 | -2.32 |
| Mohawk Data Sciences | 107 1/2 | 77 1/2 | 1684 | 93 3/8 | 84 | 85 5/8 | +2 5/8 | +3.16 |
| Planning Research | 45 1/4 | 28 | 241 | 40 1/2 | 37 3/4 | 38 1/8 | +1/8 | +3.29 |
| Potter Instrument | 38 1/2 | 20 1/2 | 246 | 29 1/8 | 27 1/4 | 27 1/2 | -1 3/8 | -4.76 |
| Randolph Computers | 64 | 34 5/8 | 481 | 47 3/8 | 44 1/2 | 46 1/8 | +1 5/8 | +3.65 |
| Systems Eng. Labs. | 42 5/8 | 21 1/2 | 541 | 32 3/8 | 27 7/8 | 28 | -3 1/2 | -1.11 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | -1.19 | -0.41 |

| OVER-THE-COUNTER | 1968 High Bid | 1968 Low Bid | August 23 Bid | August 23 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 33 1/2 | 14 1/2 | 27 | 29 | 27 | - - | - - |
| Aries Corp. | 24 | 15 1/2 | 18 1/2 | 19 1/2 | 19 | -1/2 | -2.63 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 15 | 15 | 16 | 17 1/4 | -2 1/4 | -13.04 |
| Computer Usage | 62 | 28 1/2 | 37 1/2 | 39 | 29 1/2 | +8 | +27.12 |
| Cyber-tronics | 19 | 11 1/2 | 13 1/2 | 14 1/4 | 13 1/4 | +1/4 | +1.89 |
| Data Products | 22 | 13 | 15 3/4 | 16 1/4 | 17 3/4 | -2 | -11.27 |
| Digitronics | 27 1/2 | 16 1/2 | 23 | 24 | 19 1/4 | -3 3/4 | -19.48 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 18 1/2 | 19 | 17 1/8 | +1 3/8 | +8.02 |
| Electronic Memories | 57 1/2 | 32 3/4 | 41 1/2 | 42 1/2 | 37 1/2 | +4 | +10.67 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 13 3/4 | 14 1/4 | 14 1/8 | -3/8 | -2.65 |
| Informatics, Inc. | 68 | 32 | 64 | ** | 64 | - - | - - |
| LMC Data, Inc. | 16 | 7 | 8 3/4 | 9 1/2 | 9 | -1/4 | -2.78 |
| Management Assistance | 16 1/8 | 10 | 10 1/4 | 10 1/2 | 10 5/8 | -3/8 | -3.53 |
| Optical Scanning Corp. | 138 | 71 | 100 | 104 | 94 | +6 | +6.38 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 95 | 97 | 85 | +8 | +9.41 |
| Standard Computers | 55 | 30 | 45 1/2 | 47 1/2 | 46 | -1/2 | -1.09 |
| Tally Corp. | 51 1/2 | 35 | 44 | 45 1/4 | 46 | -2 | -4.35 |
| TBS Computer Centers Corp. | 21 3/4 | 12 1/4 | 15 1/2 | 16 1/2 | 13 1/2 | +2 | +12.90 |
| University Computing | 158 | 57 | 143 | 147 | 130 | +13 | +10.00 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 27,1968 • VOL.4,NO.4 P.J.McGOVERN,EDITOR

Exclusive Report -- The *EDP 100*

## SELECT GROUP OF 100 U.S. CORPORATIONS HAVE ALMOST 50% OF COMPUTER SYSTEMS WITHIN INDUSTRIAL COMPANIES

The concept isn't new, but the latest facts are impressive:

Any good marketing executive knows that the bulk of his business usually is conducted with a very small percentage of his customers. And in the computer business, this is true in spades. A mere 0.4% of this country's computer customers -- the top 100 users among industrial companies -- operate computing systems worth over 17% of all computing equipment controlled by U.S.-based organizations. Indeed, among industrial users (which account for 42.5% of the value of computers used by non-governmental organizations based in this country), this group of 100 uses $2.67 billion -- some 46.3% of the installed computing systems.

This is one conclusion that can be drawn from a four-month-long study of the value of computing equipment used by the 500 largest industrial corporations in the United States. The study -- conducted by EDP Industry Report in conjunction with the International Data Corporation, publisher of this newsletter -- is similar, but not completely comparable, to one published 18 months ago (EDP I&MR,Feb. 10,1967), which included foreign-based industrials. Results of the current roster, labeled the *EDP 100*, appear on pages 3-5 of this issue.

### Selection of companies included

The companies contacted for this study were those included in Fortune magazine's July 15, 1967 issue. A few additional public companies, known to be large computer users, were also contacted. The financial information for these companies is taken from the July 15, 1968 issue of Fortune or from other widely used sources. The values of installed computing equipment is calculated on the basis of cost of equipment, when new, and is based on returns from the companies and/or on other information available to us from the International Data Corporation.

Companies which manufacture computers present a real dilemma in preparing data such as that presented here. It is hard to segment computers used for product development, programming, and sales support from those actually used for internal business data processing. Where considered feasible, these have been eliminated from the company's total, and the remainder presented in the tabulation. Certain companies, however . . . companies such as IBM and Control Data . . . derive a significant share of their business from the manufacture, sale, or lease of digital computer systems or services. These have simply been omitted.

**E|D|P Industry Report and Market Review,** formerly **E|D|P Industry and Market Report,** is published twenty-four times each year by the International Data Publishing Co., 60 Austin Street, Newtonville, Mass. 02160. Entire contents © 1968 by the International Data Corporation. James Peacock, Managing Editor; Fred Anderson, Steven Pease, Associate Editors; William Leitch, Contributing Editor; A. Whelan, Circulation Manager. Editorial ideas and information are collected from numerous industry experts, and are researched and formulated by members of the editorial staff. The information and opinions contained in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. Subscriptions: One Year, $75. Single copies, priced as indicated on inside pages, air-mailed same day requested. Prices for multiple copies available on request. Telephone (617) 969-4020. Reproduction without written permission is completely forbidden.

To qualify as industrial corporations, and thus be included in this study, a company must have received at least 50% of its revenue from manufacturing or mining during its most recent fiscal year. Thus, AT&T, a utility, does not qualify, even though it is the largest computer user outside the Federal Government. However, Western Electric, AT&T's manufacturing affiliate, is included in the *EDP 100* as number 13, with $55.41 million of installed computers.

Interpretation

In addition to simply listing the companies and the value of their computers, we have presented other pertinent data and have calculated several ratios to assist the reader in making his own analysis. Tables II, III, and IV give the value of computers for each $1000 in sales, for each $1000 in assets, and per employee . . . for each industry group. The results of each measurement are different, as the bar charts illustrate, but they serve as useful yardsticks in evaluating computer usage.

From the data provided, endless different comparisons and interpretations can be made. There are, however, no striking truisms . . . no simple calculations or ratios that prove an organization must abound in computers before it can be profitable. Here are some of the more general findings that can be derived from the data in this report on the *EDP 100*.

- When the value of computers per employee is examined (Table IV) we see two groups with exceptionally high values -- aerospace and petroleum -- but the result of completely different circumstances. The former is very highly technically advanced. with many of its computers owned or supported by the U.S. Government. Petroleum, on the other hand, is a capital intensive industry . . . a fact further illustrated by its high sales/employee relationship (Table I).

- Looking at the total value of computers installed within particular industries (Table I), of course, is virtually like looking at the top companies in sales or assets. Certain industries -- the automotive, aerospace, and electronic -- tend to have fewer major participants, and more "giants." This is clear from the table.

- The distribution of computer value by sales and/or assets (Tables II and III) probably offers the greatest field for analysis. The aerospace industry is virtually in a class by itself, and figures for it are likely meaningful only when looking at the specific companies involved. The high value for the Electrical/Electronics companies, however, could indicate that we have failed to eliminate some of the computers they use in sales, etc., but more likely shows that companies that manufacture computers or components are finally beginning to use computers in more sophisticated ways.

It should be pointed out that Tables II-IV have a column labeled "Ratio: Industry/Average." These ratios compare each individual industry to the average for all 100 companies in the three different categories. Table II, for example, shows that the automotive industry has only 81% as much computing equipment as the "average" company in the top 100, while the aerospace industry has 2.35 times as much.

We hope that the data in this report will help readers to compare themselves with the giants. Such an exercise should at least prove enlightening!



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| NAME | RANK BY VALUE COMPUTER | VALUE COMPUTERS INSTALLED ($ MILLION) | RANK BY SALES SIZE | 1967 SALES ($ MILLION) | VALUE COMPUTERS $1000 SALES | NO. EMPLOYEES (1000) | VALUE COMPUTERS EMPLOYEE | SALES EMPLOYEE | ASSETS ($ MILLION) | VALUE COMPUTERS $1000 ASSETS | % PROFITS | INDUSTRY GROUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| General Motors | 1 | 201.50 | 1 | 20,026 | $10.06 | 728 | $ 276 | $ 27,508 | 13,273 | $15.18 | 8.1 | A |
| Boeing | 2 | 128.90 | 19 | 2,880 | 44.76 | 142 | 903 | 20,180 | 2,030 | 63.48 | 2.9 | S |
| General Electric | 3 | 120.00 | 4 | 7,741 | 15.50 | 375 | 320 | 20,643 | 5,347 | 14.49 | 4.7 | E |
| Ford Motor Co | 4 | 110.00 | 3 | 10,515 | 10.45 | 394 | 279 | 26,668 | 7,967 | 13.80 | 0.8 | A |
| McDonnell-Douglas | 5 | 100.00 | 16 | 2,934 | 34.05 | 140 | 714 | 20,955 | 1,365 | 73.20 | 0.0 | S |
| Lockheed | 6 | 87.72 | 30 | 2,335 | 37.56 | 92 | 951 | 25,322 | 881 | 99.56 | 2.3 | S |
| Westinghouse | 7 | 78.50 | 18 | 2,901 | 27.06 | 132 | 594 | 21,975 | 2,075 | 37.83 | 4.2 | E |
| Shell Oil Co | 8 | 77.80 | 14 | 3,073 | 25.31 | 38 | 2,030 | 80,176 | 3,420 | 22.75 | 9.3 | P |
| North Am Rockwell | 9 | 76.25 | 28 | 2,438 | 31.27 | 115 | 661 | 21,144 | 1,143 | 66.66 | 2.8 | S |
| Sperry Rand | 10 | 67.50 | 46 | 1,487 | 52.11 | 101 | 763 | 14,637 | 1,033 | 75.04 | 3.6 | E |
| Standard Oil (N J) | 11 | 59.75 | 2 | 13,266 | 4.50 | 150 | 398 | 88,440 | 15,197 | 3.93 | 9.3 | P |
| Chrysler | 12 | 57.60 | 5 | 6,213 | 9.27 | 215 | 267 | 28,779 | 3,854 | 14.94 | 3.2 | A |
| Western Electric | 13 | 55.41 | 11 | 3,718 | 14.91 | 170 | 327 | 21,906 | 2,553 | 21.70 | 4.1 | E |
| General Dynamics | 14 | 54.25 | 32 | 2,253 | 24.07 | 103 | 525 | 21,835 | 920 | 58.97 | 2.5 | S |
| U S Steel | 15 | 52.20 | 10 | 4,006 | 13.03 | 198 | 264 | 20,266 | 5,606 | 9.31 | 4.3 | I |
| Mobil Oil Corp | 16 | 48.09 | 6 | 5,772 | 8.32 | 80 | 602 | 72,328 | 6,224 | 7.71 | 6.7 | P |
| Du Pont | 17 | 47.50 | 13 | 3,102 | 15.31 | 112 | 424 | 27,885 | 3,071 | 15.47 | 10.1 | C |
| RCA | 18 | 47.10 | 15 | 3,014 | 15.63 | 128 | 368 | 23,547 | 2,083 | 22.60 | 4.9 | E |
| General Telephone | 19 | 42.95 | 23 | 2,622 | 16.38 | 151 | 284 | 17,367 | 5,430 | 7.91 | 8.5 | E |
| Gulf Oil Corp | 20 | 42.10 | 9 | 4,202 | 10.02 | 58 | 722 | 72,077 | 6,457 | 6.52 | 13.8 | P |
| Union Carbide | 21 | 42.10 | 25 | 2,545 | 16.24 | 100 | 422 | 25,508 | 3,088 | 13.61 | 6.7 | C |
| Standard Oil (Ind) | 22 | 40.34 | 17 | 2,918 | 13.82 | 45 | 896 | 64,311 | 4,058 | 9.94 | 9.7 | P |
| United Aircraft | 23 | 37.90 | 33 | 2,212 | 17.13 | 47 | 805 | 47,070 | 915 | 41.41 | 3.3 | S |
| Eastman Kodak | 24 | 30.25 | 29 | 2,392 | 12.64 | 106 | 286 | 22,647 | 2,233 | 13.54 | 14.7 | C |
| ITT | 25 | 28.70 | 21 | 2,760 | 10.40 | 236 | 109 | 11,697 | 2,961 | 9.69 | 4.4 | E |
| Texaco | 26 | 28.60 | 8 | 5,121 | 5.58 | 80 | 358 | 64,199 | 7,163 | 3.99 | 14.7 | P |
| Dow Chemical | 27 | 27.95 | 53 | 1,383 | 20.21 | 36 | 768 | 37,986 | 1,911 | 14.63 | 9.5 | C |
| Standard Oil (Cal) | 28 | 27.60 | 12 | 3,298 | 8.37 | 48 | 578 | 69,034 | 5,310 | 5.20 | 12.8 | P |
| Raytheon | 29 | 25.50 | 71 | 1,106 | 23.08 | 46 | 554 | 24,023 | 460 | 55.43 | 2.6 | E |
| Martin Marietta | 30 | 25.65 | 127 | 696 | 36.59 | 30 | 863 | 23,579 | 527 | 48.71 | 5.3 | S |
| Bethlehem Steel | 31 | 24.65 | 24 | 2,594 | 9.50 | 131 | 188 | 19,802 | 3,084 | 7.99 | 5.0 | I |
| Sun Oil Co | 32 | 23.80 | 67 | 1,152 | 20.67 | 22 | 1,063 | 51,461 | 1,599 | 14.89 | 9.4 | P |
| General Tire & Rubber | 33 | 23.20 | 90 | 954 | 24.30 | 41 | 562 | 23,110 | 742 | 31.29 | 3.4 | R |
| Int'l Harvester | 34 | 22.95 | 26 | 2,542 | 9.03 | 111 | 206 | 22,819 | 1,812 | 12.67 | 3.7 | A |
| Goodyear Tire & Rubber | 35 | 22.80 | 22 | 2,638 | 8.64 | 113 | 201 | 23,301 | 2,083 | 10.95 | 4.8 | R |
| Bendix | 36 | 21.60 | 61 | 1,274 | 16.95 | 69 | 312 | 18,413 | 883 | 25.97 | 3.4 | E |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Xerox | 37 | 21.65 | 126 | 701 | $30.58 | 24 | $ 876 | $ 28,636 | 794 | $27.03 | 13.9 | E |
| Grumman Aircraft | 38 | 19.65 | 87 | 969 | 20.39 | 36 | 549 | 27,056 | 315 | 62.31 | 2.2 | S |
| Monsanto | 39 | 18.40 | 41 | 1,632 | 11.89 | 59 | 308 | 27,762 | 1,859 | 9.74 | 6.4 | C |
| Litton Industries | 40 | 17.20 | 44 | 1,562 | 11.01 | 96 | 180 | 16,352 | 945 | 18.20 | 4.5 | M |
| Singer | 41 | 16.50 | 69 | 1,138 | 14.50 | 105 | 157 | 10,835 | 1,049 | 15.73 | 4.4 | Y |
| Alcoa | 42 | 16.35 | 56 | 1,361 | 12.01 | 50 | 324 | 26,969 | 2,059 | 7.39 | 7.9 | I |
| Motorola | 43 | 16.25 | 140 | 629 | 25.79 | 36 | 451 | 17,499 | 411 | 39.56 | 3.0 | E |
| General Foods | 44 | 15.65 | 40 | 1,651 | 9.48 | 32 | 489 | 51,612 | 929 | 16.85 | 6.0 | F |
| International Paper | 45 | 15.30 | 50 | 1,414 | 10.82 | 52 | 294 | 27,702 | 1,470 | 10.41 | 6.3 | L |
| B. F. Goodrich | 46 | 15.30 | 83 | 1,006 | 15.21 | 46 | 333 | 21,436 | 903 | 16.94 | 3.5 | R |
| Philips Petroleum | 47 | 15.00 | 36 | 1,982 | 7.57 | 36 | 420 | 55,469 | 2,787 | 5.38 | 8.3 | P |
| Cities Service | 48 | 14.75 | 54 | 1,375 | 10.73 | 23 | 650 | 60,566 | 1,829 | 8.07 | 9.3 | P |
| Uniroyal | 49 | 14.00 | 63 | 1,265 | 11.07 | 65 | 214 | 19,388 | 1,015 | 13.79 | 2.6 | R |
| Sinclair Refining | 50 | 13.90 | 47 | 1,483 | 9.37 | 19 | 728 | 77,655 | 1,810 | 7.68 | 6.4 | P |
| Northrop Corporation | 51 | 13.85 | 181 | 469 | 29.50 | 24 | 587 | 19,892 | 301 | 46.06 | 2.7 | S |
| Olin Mathieson | 52 | 13.10 | 97 | 901 | 14.54 | 29 | 452 | 31,074 | 946 | 13.85 | 6.0 | C |
| Jones & Laughlin | 53 | 13.03 | 96 | 904 | 14.42 | 40 | 330 | 22,859 | 1,093 | 11.92 | 4.0 | I |
| J. Deere Co | 54 | 12.93 | 73 | 1,086 | 11.90 | 45 | 285 | 23,911 | 1,322 | 9.78 | 5.3 | A |
| W R Grace Co | 55 | 12.89 | 43 | 1,576 | 8.18 | 64 | 201 | 24,630 | 1,578 | 8.17 | 3.3 | C |
| Continental Oil Co | 56 | 12.85 | 35 | 2,083 | 6.17 | 33 | 386 | 62,579 | 2,354 | 5.46 | 7.2 | P |
| Time Inc | 57 | 12.63 | 174 | 506 | 24.95 | 10 | 1289 | 51,660 | 475 | 26.59 | 6.0 | Y |
| Weyerhauser | 58 | 12.15 | 76 | 904 | 13.44 | 36 | 337 | 25,017 | 1,093 | 11.12 | 5.5 | L |
| Burlington Industries | 59 | 12.00 | 55 | 1,364 | 8.79 | 74 | 162 | 18,440 | 1,028 | 11.68 | 4.3 | Y |
| Atlantic-Richfield | 60 | 11.30 | 59 | 1,277 | 8.85 | 19 | 594 | 67,140 | 1,886 | 5.99 | 10.2 | P |
| McGraw-Hill | 61 | 11.20 | 254 | 328 | 34.12 | 12 | 913 | 26,768 | 270 | 41.51 | 8.8 | Y |
| Kaiser Alum & Chem | 62 | 11.20 | 115 | 772 | 14.51 | 27 | 409 | 28,174 | 1,230 | 9.10 | 7.0 | I |
| Union Oil of Cal | 63 | 11.00 | 51 | 1,412 | 7.79 | 17 | 647 | 83,074 | 2,026 | 5.43 | 10.3 | P |
| Armour | 64 | 10.85 | 34 | 2,157 | 5.03 | 38 | 287 | 57,056 | 692 | 15.68 | 1.0 | F |
| Tenneco Inc | 65 | 10.70 | 39 | 1,178 | 6.02 | 40 | 267 | 44,443 | 3,589 | 2.98 | 7.8 | C |
| Hercules, Inc | 66 | 10.35 | 136 | 643 | 16.11 | 33 | 310 | 19,240 | 656 | 15.79 | 7.3 | C |
| Allis-Chalmers | 67 | 10.10 | 103 | 822 | 12.29 | 34 | 301 | 24,492 | 637 | 15.86 | 0.6 | E |
| Texas Instruments | 68 | 9.90 | 152 | 568 | 17.41 | 39 | 256 | 14,676 | 387 | 25.56 | 4.0 | E |
| American Motors | 69 | 9.45 | 113 | 778 | 12.15 | 24 | 399 | 32,822 | 378 | 25.02 | --- | A |
| Mead | 70 | 9.35 | 139 | 633 | 14.77 | 36 | 255 | 17,586 | 499 | 18.72 | 3.2 | L |
| Kaiser Industries | 71 | 9.27 | 110 | 794 | 11.59 | 24 | 387 | 33,365 | 573 | 16.08 | 9.0 | M |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Charles Pfifzer & Co | 72 | 8.75 | 138 | 638 | $13.72 | 33 | $263 | $19,181 | 658 | $13.30 | 9.1 | C |
| Eaton Yale & Co | 73 | 8.75 | 122 | 751 | 11.66 | 36 | 244 | 20,894 | 530 | 16.52 | 4.2 | M |
| General Mills | 74 | 8.75 | 146 | 602 | 14.52 | 12 | 735 | 16,425 | 367 | 23.85 | 4.7 | F |
| Armco Steel Corp | 75 | 8.70 | 68 | 1,138 | 11.38 | 38 | 385 | 29,586 | 1,450 | 14.49 | 6.2 | I |
| Whirlpool | 76 | 8.70 | 114 | 774 | 11.24 | 21 | 417 | 37,077 | 401 | 21.69 | 4.3 | Y |
| Inland Steel | 77 | 8.65 | 85 | 992 | 8.72 | 31 | 277 | 31,733 | 1,131 | 7.65 | 5.4 | I |
| Nat'l Dairy Prod | 78 | 8.55 | 31 | 2,319 | 3.69 | 47 | 182 | 49,269 | 915 | 9.34 | 3.3 | F |
| American Home Prod | 79 | 8.55 | 86 | 987 | 8.67 | 36 | 235 | 27,161 | 602 | 14.21 | 10.5 | Y |
| Corning Glass Works | 80 | 8.33 | 198 | 435 | 19.13 | 23 | 362 | 18,927 | 416 | 20.00 | 11.5 | M |
| Borg-Warner | 81 | 8.27 | 92 | 951 | 8.69 | 39 | 213 | 24,504 | 755 | 10.95 | 4.5 | M |
| Allied Chemical | 82 | 8.10 | 64 | 1,243 | 6.51 | 37 | 217 | 33,335 | 1,603 | 5.05 | 5.9 | C |
| American Cyanamid | 83 | 8.10 | 94 | 937 | 8.64 | 36 | 226 | 26,120 | 910 | 8.90 | 7.5 | C |
| Armstrong Cork | 84 | 8.10 | 188 | 460 | 17.60 | 21 | 381 | 21,629 | 353 | 22.93 | 5.9 | Y |
| FMC | 85 | 8.10 | 58 | 133 | 6.17 | 53 | 152 | 24,614 | 932 | 8.69 | 4.6 | M |
| Genesco | 86 | 8.05 | 100 | 872 | 9.23 | 60 | 134 | 14,535 | 364 | 22.14 | 2.9 | Y |
| Continental Can Co | 87 | 7.45 | 52 | 1,398 | 5.33 | 47 | 157 | 29,455 | 1,013 | 7.36 | 5.6 | M |
| Owens-Illinois Inc | 88 | 7.40 | 88 | 962 | 7.69 | 54 | 137 | 17,879 | 1,008 | 7.34 | 4.7 | M |
| Standard Oil of Ohio | 89 | 7.30 | 143 | 622 | 11.74 | 12 | 613 | 52,193 | 682 | 10.70 | 10.3 | P |
| Colgate-Palmolive | 90 | 7.13 | 81 | 1,025 | 6.95 | 25 | 285 | 41,014 | 515 | 13.85 | 3.3 | Y |
| Int'l Mineral & Chem | 91 | 7.05 | 252 | 330 | 21.39 | 8 | 909 | 42,503 | 502 | 14.03 | 3.6 | C |
| Signal Oil & Gas | 92 | 6.95 | 57 | 1,322 | 5.26 | 36 | 191 | 36,412 | 1,090 | 6.37 | 3.7 | P |
| A O Smith | 93 | 6.75 | 251 | 330 | 20.46 | 14 | 492 | 24,037 | 191 | 35.39 | 2.9 | M |
| Marathon Oil | 94 | 6.65 | 128 | 696 | 9.56 | 8 | 812 | 84,982 | 977 | 6.80 | 10.6 | P |
| Anaconda | 95 | 6.38 | 76 | 1,047 | 6.09 | 46 | 138 | 22,708 | 1,385 | 4.61 | 9.0 | I |
| Rexall Drug | 96 | 6.25 | 161 | 532 | 11.76 | 24 | 256 | 21,776 | 441 | 14.18 | 5.8 | Y |
| St Regis Paper | 97 | 6.10 | 125 | 722 | 8.44 | 30 | 206 | 24,424 | 834 | 7.32 | 4.2 | L |
| Hunt Food & Inds | 98 | 6.05 | 165 | 524 | 11.55 | 14 | 448 | 39,452 | 464 | 13.04 | 2.0 | F |
| Borden | 99 | 5.75 | 42 | 1,588 | 3.62 | 39 | 147 | 40,495 | 1,012 | 5.68 | 3.5 | F |
| Anheuser-Busch | 100 | 5.69 | 155 | 555 | 10.25 | 10 | 570 | 55,566 | 474 | 12.00 | 6.5 | F |
| | | $2,697.24 | | $207,725 | 13.04 | 7,150 | 382 | 29,052 | 191,871 | 14.14 | | |

+ CODES FOR CLASSIFICATION BY PRIMARY INDUSTRY GROUP AMONG TOP 100 U.S. INDUSTRIAL COMPUTER USERS

Aerospace . . . . . S
Automotive & Related. . . . . A
Chemicals . . . . . C
Consumer Products/Services. . . Y
Electrical/Electronics . . . . . E
Food & Beverage. . . . . F
Paper. . . . . L
Petroleum. . . . . P
Primary Metals . . . . . I
Rubber . . . . . R
Other General Industrial . . . . M

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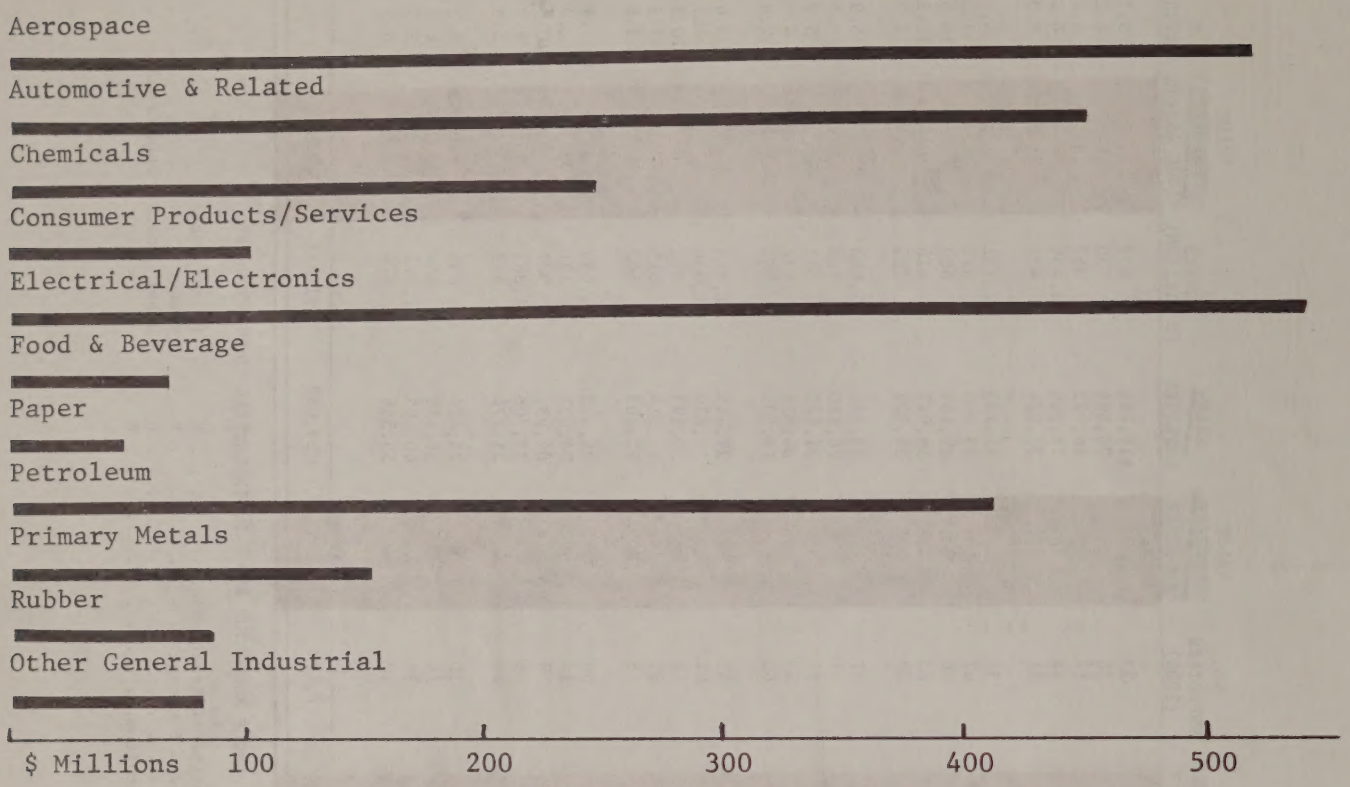
TABLE I DISTRIBUTION OF COMPUTER VALUE WITHIN INDUSTRY GROUPS




| Industry Group | Number of Companies | Original Value of Installed Computers ($ Millions) | Average Sales Per Employee | % Total Value of Computers |
|---|---|---|---|---|
| Aerospace | 9 | $ 543.97 | $ 22,220 | 20.2 % |
| Automotive | 6 | 414.43 | 27,085 | 15.3 |
| Chemicals | 13 | 244.94 | 29,409 | 9.1 |
| Consumer | 10 | 99.11 | 27,090 | 3.7 |
| Elec./Elec. | 13 | 544.96 | 27,655 | 20.2 |
| Food & Bev. | 7 | 61.29 | 44,268 | 2.3 |
| Paper | 4 | 42.90 | 23,557 | 1.6 |
| Petroleum | 17 | 442.07 | 67,182 | 16.4 |
| Metals | 8 | 146.56 | 25,262 | 5.4 |
| Rubber | 4 | 75.30 | 21,809 | 2.8 |
| Other | 9 | 81.46 | 27,149 | 3.0 |



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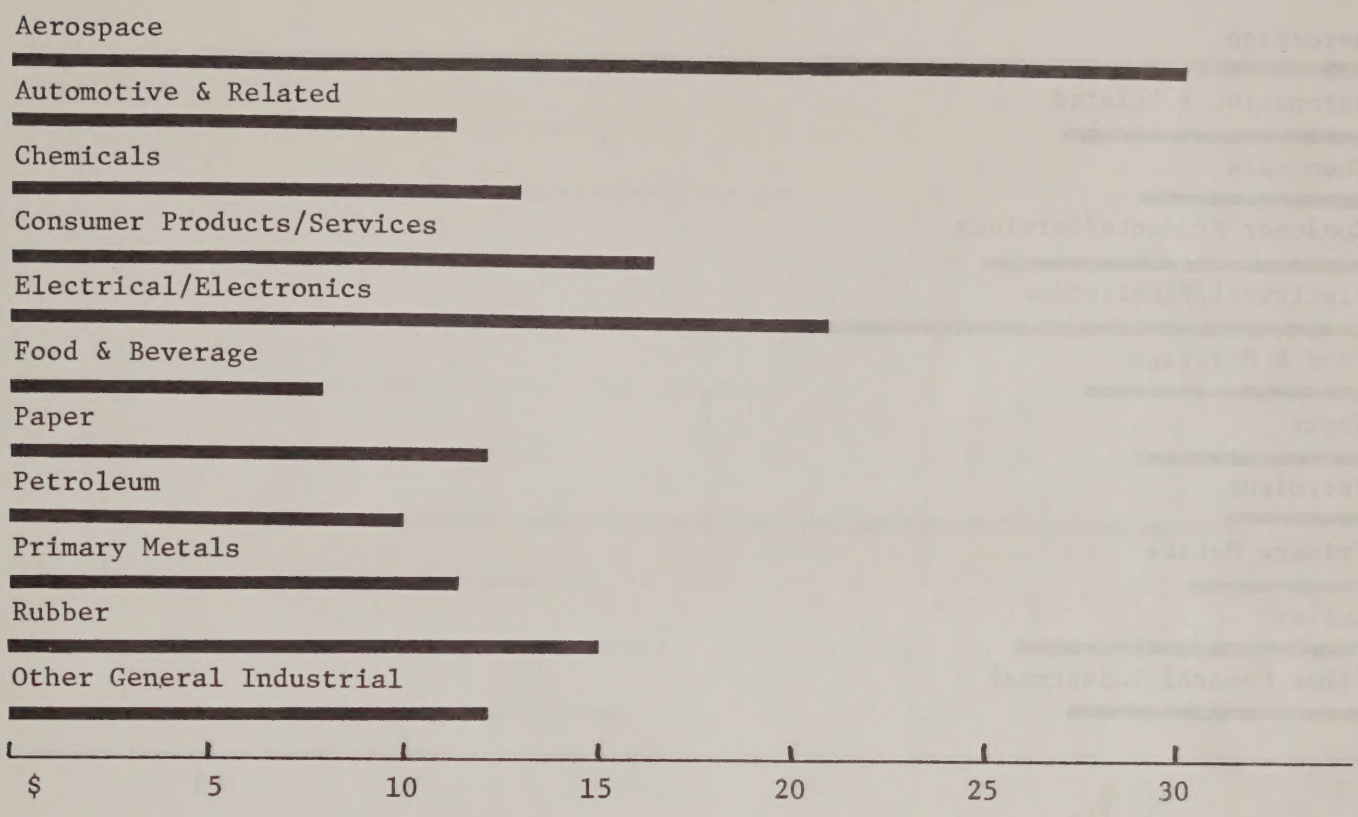
TABLE II COMPUTER VALUE/$1000 SALES WITHIN INDUSTRY GROUPS




| Industry Group | Number of Companies | Value of Computers/$1000 Sales High | Low | Average | Ratio: Industry / Average |
|---|---|---|---|---|---|
| Aerospace | 9 | $ 44.76 | $ 17.13 | $ 30.57 | 2.35 |
| Automotive | 6 | 12.15 | 9.03 | 10.48 | 0.81 |
| Chemicals | 13 | 21.39 | 6.02 | 13.12 | 1.02 |
| Consumer | 10 | 34.12 | 6.95 | 14.71 | 1.14 |
| Elec./Elec. | 13 | 52.11 | 10.40 | 21.39 | 1.66 |
| Food & Bev. | 7 | 14.52 | 3.62 | 8.31 | 0.64 |
| Paper | 4 | 14.77 | 8.45 | 11.87 | 0.92 |
| Petroleum | 17 | 25.31 | 4.50 | 9.76 | 0.74 |
| Metals | 8 | 14.51 | 6.09 | 11.21 | 0.87 |
| Rubber | 4 | 24.30 | 8.64 | 14.80 | 1.15 |
| Other | 9 | 20.46 | 5.33 | 11.75 | 0.91 |



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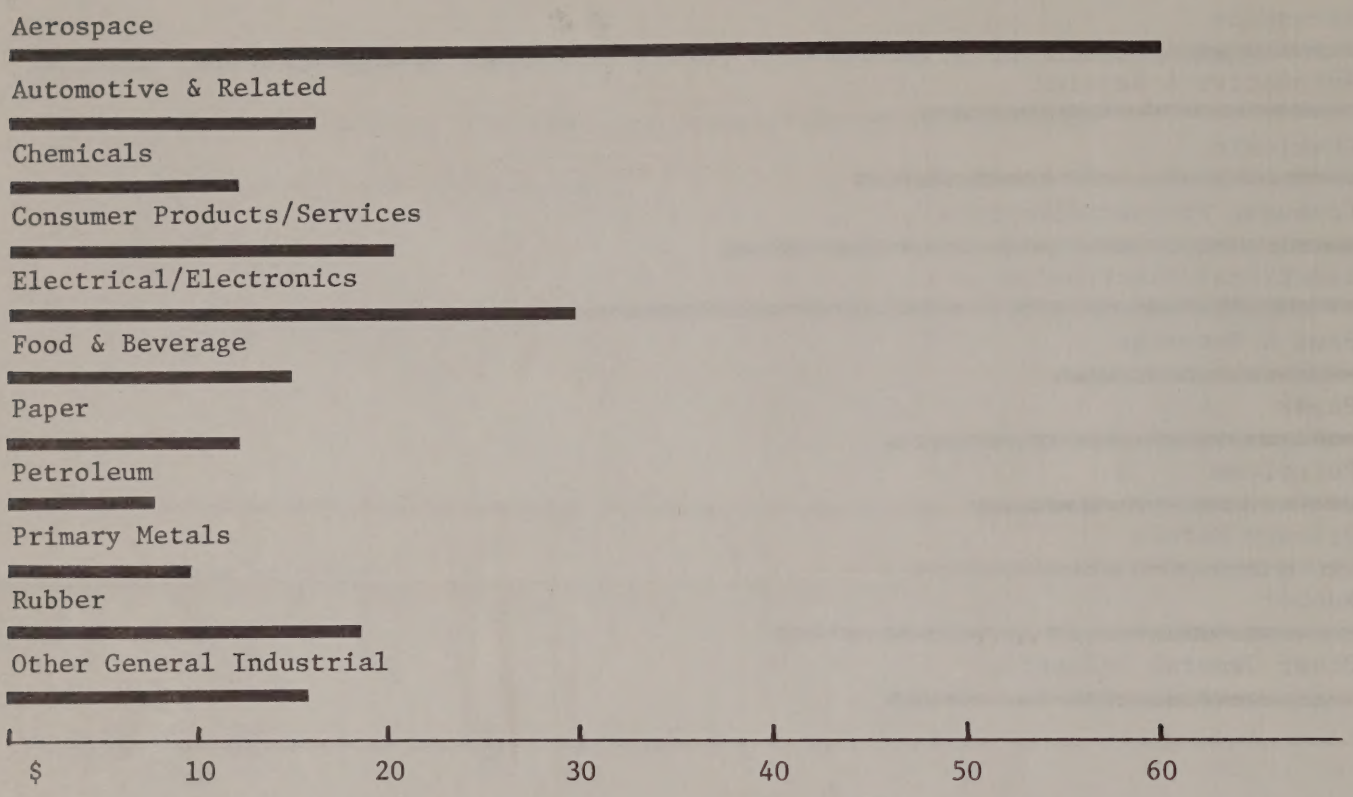
TABLE III COMPUTER VALUE/$1000 ASSETS WITHIN INDUSTRY GROUPS




| Industry Group | Number of Companies | Value of Computers/$1000 Assets High | Low | Average | Ratio: Industry/ Average |
|---|---|---|---|---|---|
| Aerospace | 9 | $ 99.56 | $ 41.41 | $ 62.22 | 4.45 |
| Automotive | 6 | 25.02 | 9.78 | 15.23 | 1.09 |
| Chemicals | 13 | 15.79 | 2.98 | 11.47 | 0.82 |
| Consumer | 10 | 41.51 | 11.68 | 20.45 | 1.46 |
| Elec./Elec. | 13 | 75.04 | 7.91 | 29.11 | 2.08 |
| Food & Bev. | 7 | 23.85 | 5.68 | 13.78 | 0.99 |
| Paper | 4 | 18.72 | 7.32 | 11.89 | 0.85 |
| Petroleum | 17 | 22.75 | 3.93 | 7.62 | 0.54 |
| Metals | 8 | 14.49 | 4.61 | 9.06 | 0.65 |
| Rubber | 4 | 31.28 | 10.75 | 18.24 | 1.31 |
| Other | 9 | 35.39 | 7.36 | 15.99 | 1.14 |



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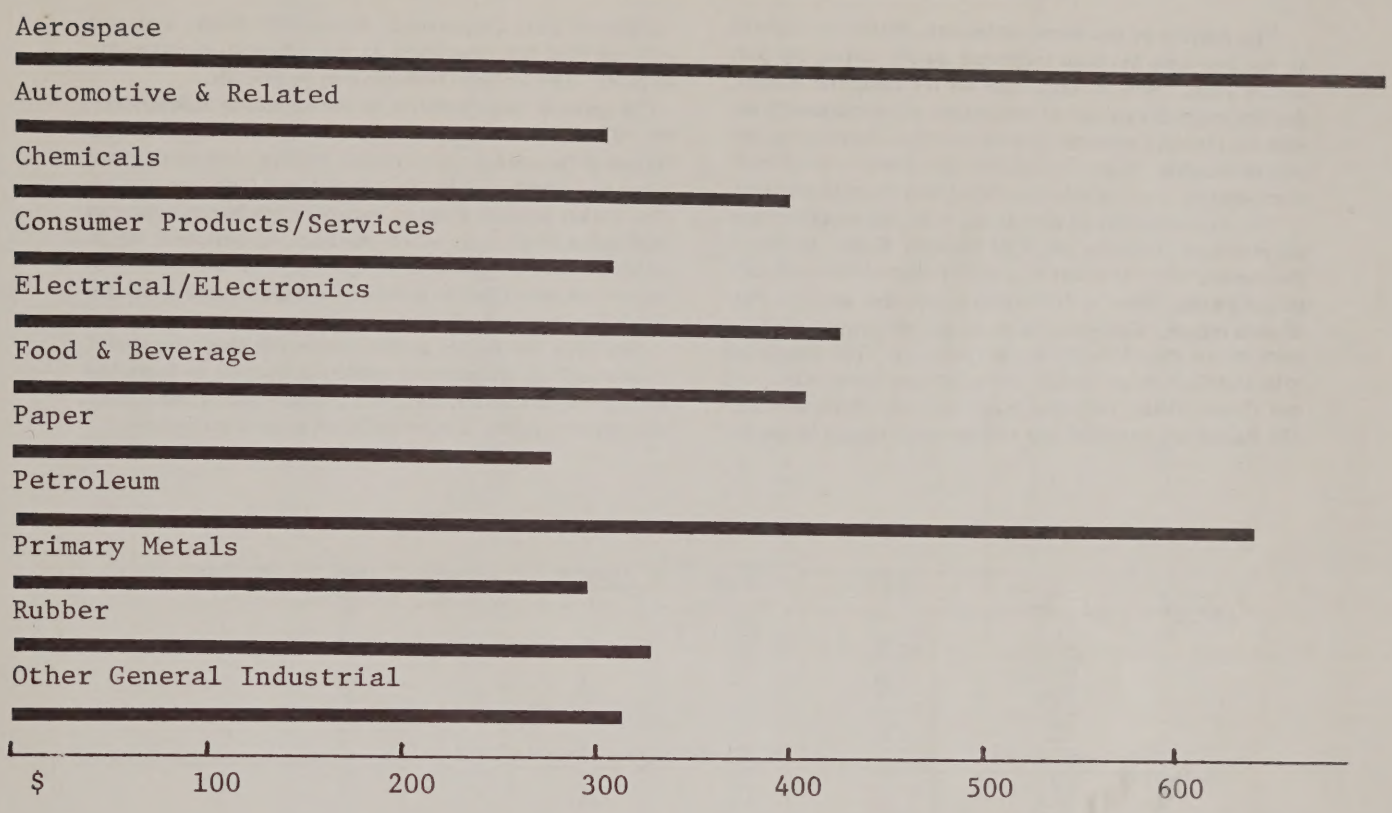
TABLE IV COMPUTER VALUE/EMPLOYEE WITHIN INDUSTRY GROUPS




| Industry Group | Number of Companies | Value of Computers/Employee High | Low | Average | Ratio: Industry/ Average |
|---|---|---|---|---|---|
| Aerospace | 9 | 951 | 525 | 728 | 1.95 |
| Automotive | 6 | 399 | 206 | 281 | 0.75 |
| Chemicals | 13 | 768 | 201 | 389 | 1.04 |
| Consumer | 10 | 913 | 129 | 307 | 0.82 |
| Elec./Elec. | 13 | 763 | 109 | 424 | 1.13 |
| Food & Bev. | 7 | 570 | 147 | 408 | 1.09 |
| Paper | 4 | 337 | 206 | 274 | 0.73 |
| Petroleum | 17 | 2030 | 191 | 651 | 1.74 |
| Metals | 8 | 409 | 138 | 289 | 0.77 |
| Rubber | 4 | 562 | 201 | 327 | 0.87 |
| Other | 9 | 613 | 152 | 311 | 0.83 |



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, EDP Industry Report publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in EDP/IR.

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF AUGUST 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $4600 | 1/54 | 25 | 3 | 28 | X |
| | 220 | $14,000 | 10/58 | 27 | 2 | 29 | X |
| | B100 | $2800 | 8/64 | 181 | 29 | 210 | 3 |
| | B200 Series | $5400 | 11/61 | 460 | 84 | 544 | 9 |
| | B300 Series | $9000 | 7/65 | 370 | 88 | 458 | 105 |
| | B500 | $3800 | 10/68 | 0 | 0 | 0 | 90 |
| | B2500 | $5000 | 2/67 | 58 | 10 | 68 | 130 |
| | B3500 | $14,000 | 5/67 | 60 | 12 | 72 | 250 |
| | B5500 | $25,000 | 3/63 | 77 | 8 | 85 | 4 |
| | B6500 | $33,000 | 6/69 | 0 | 0 | 0 | 40 |
| | B7500 | $44,000 | 9/69 | 0 | 0 | 0 | 16 |
| | B8500 | $200,000 | 12/68 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $1600 | 7/55 | 276 | 12 | 288 | X |
| | G-20 | $15,500 | 4/61 | 18 | 2 | 20 | X |
| | LGP-21 | $725 | 12/62 | 150 | 3 | 153 | X |
| | LGP-30 | $1300 | 9/56 | 110 | 5 | 115 | X |
| | RPC-4000 | $1875 | 1/61 | 50 | 4 | 54 | X |
| | 160*/160A/160C | $2100/$5000/$12,000 | 5/60;7/61;3/64 | 467 | 39 | 506 | X |
| | 924/924A | $11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $45,000 | 1/60 | 48 | 3 | 51 | X |
| | 1700 | $3800 | 5/66 | 110 | 38 | 148 | 130 |
| | 3100/3150 | $10,000 | 12/64 | 105 | 26 | 131 | 26 |
| | 3200 | $14,000 | 5/64 | 46 | 16 | 62 | X |
| | 3300 | $20,000 | 9/65 | 89 | 23 | 112 | 30 |
| | 3400 | $18,000 | 11/64 | 15 | 4 | 19 | X |
| | 3500 | $25.000 | 8/68 | 0 | 0 | 0 | 26 |
| | 3600 | $52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $53,000 | 2/66 | 21 | 3 | 24 | 6 |
| | 6400/6500 | $56,000 | 5/66 | 36 | 12 | 8 | 30 |
| | 6600 | $115,000 | 8/64 | 32 | 8 | 40 | 18 |
| | 7600 | $150,000 | 11/68 | 0 | 0 | 0 | 2 |
| Digital Equipment Corp. | PDP-1 | $3400 | 11/60 | 56 | 3 | 59 | X |
| | PDP-4 | $1700 | 8/62 | 49 | 5 | 54 | X |
| | PDP-5 | $900 | 9/63 | 98 | 11 | 109 | X |
| | PDP-6 | $10,000 | 10/64 | 14 | 5 | 19 | X |
| | PDP-7 | $1300 | 11/64 | 140 | 41 | 181 | 4 |
| | PDP-8 | $525 | 4/65 | 1620 | 430 | 2050 | 40 |
| | PDP-9 | $1100 | 12/66 | 167 | 43 | 210 | 32 |
| | PDP-10 | $9000 | 10/67 | 19 | 1 | 20 | 20 |
| Electronic Associates | 640 | $1200 | 9/67 | 22 | 14 | 36 | 15 |
| | 8400 | $12,000 | 6/65 | 18 | 6 | 24 | 4 |
| EMR Computer Division | ASI 210 | $3850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $4200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $4400 | 4/65 | 16 | 0 | 16 | 2 |
| | ADVANCE 6040 | $5600 | 7/65 | 5 | 3 | 8 | 4 |
| | ADVANCE 6050 | $9000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $1550 | 10/67 | 16 | 3 | 19 | 14 |
| General Electric | 115 | $2200 | 12/65 | 340 | 440 | 780 | 480 |
| | 130 | $4500 | 3/69 | 0 | 0 | 0 | 110 |
| | 205 | $2900 | 6/64 | 15 | 0 | 15 | X |
| | 210 | $16,000 | 7/59 | 37 | 0 | 37 | X |
| | 215 | $6000 | 9/63 | 20 | 3 | 23 | X |
| | 225 | $8300 | 4/61 | 145 | 20 | 165 | X |
| | 235 | $12,500 | 4/64 | 114 | 24 | 138 | 22 |
| | 405 | $6000 | 2/68 | 21 | 4 | 25 | 58 |
| | 415 | $11,000 | 5/64 | 317 | 103 | 420 | 50 |
| | 425 | $18,000 | 6/64 | 113 | 33 | 146 | 40 |
| | 435 | $25,000 | 9/65 | 34 | 11 | 45 | 17 |
| | 625 | $50,000 | 4/65 | 38 | 7 | 45 | 20 |
| | 635 | $60,000 | 5/65 | 44 | 6 | 50 | 22 |
| | 645 | $90,000 | 7/66 | 7 | 0 | 7 | 2 |
| | GE-PAC 4020 | $5000 | 2/67 | 41 | 15 | 56 | 95 |
| | GE-PAC 4040 | $3000 | 8/64 | 42 | 14 | 56 | 9 |
| | GE-PAC 4050 | $7000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $8500 | 6/65 | 16 | 2 | 18 | 2 |



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AS OF AUGUST 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $2500 | 5/63 | 76 | 2 | 78 | X |
| | DDP-116 | $900 | 4/65 | 192 | 38 | 230 | 16 |
| | DDP-124 | $2050 | 3/66 | 53 | 17 | 70 | 19 |
| | DDP-224 | $3300 | 3/65 | 46 | 10 | 56 | 2 |
| | DDP-516 | $700 | 9/66 | 117 | 43 | 160 | 140 |
| | H-110 | $2500 | 9/68 | 0 | 0 | 0 | 100 |
| | H-120 | $4000 | 1/66 | 705 | 155 | 860 | 140 |
| | H-125 | $5000 | 12/67 | 36 | 4 | 40 | 75 |
| | H-200 | $8600 | 3/64 | 800 | 335 | 1135 | 120 |
| | H-400 | $8500 | 12/61 | 55 | 36 | 91 | X |
| | H-632 | $3500 | 11/68 | 0 | 0 | 0 | 30 |
| | H-800 | $28,000 | 12/60 | 60 | 14 | 74 | X |
| | H-1200 | $10,000 | 2/66 | 180 | 43 | 223 | 90 |
| | H-1250 | $12,000 | 8/68 | 0 | 0 | 0 | 44 |
| | H-1400 | $14,000 | 1/64 | 9 | 2 | 11 | X |
| | H-1800 | $50,000 | 1/64 | 17 | 4 | 21 | X |
| | H-2200 | $16,000 | 1/66 | 99 | 19 | 118 | 70 |
| | H-4200 | $20,500 | 8/68 | 0 | 0 | 0 | 25 |
| | H-8200 | $50,000 | 12/68 | 0 | 0 | 0 | 10 |
| IBM | 305 | $3600 | 12/57 | 67 | 25 | 92 | X |
| | 360/20 | $2800 | 12/65 | 4870 | 3480 | 8350 | 3400 |
| | 360/25 | $5330 | 1/69 | 0 | 0 | 0 | 2200 |
| | 360/30 | $9300 | 5/65 | 4800 | 3350 | 8150 | 1500 |
| | 360/40 | $19,500 | 4/65 | 2735 | 1015 | 3750 | 700 |
| | 360/44 | $15,000 | 7/66 | 280 | 80 | 360 | 90 |
| | 360/50 | $33,000 | 8/65 | 920 | 240 | 1160 | 890 |
| | 360/65 | $70,000 | 11/65 | 468 | 92 | 560 | 360 |
| | 360/67 | $138,000 | 6/66 | 34 | 8 | 42 | 35 |
| | 360/75 | $81,400 | 1/66 | 32 | 8 | 40 | 15 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 22 |
| | 360/90 Series | $150,000 | 11/67 | 4 | 0 | 4 | 15 |
| | 650 | $4800 | 11/54 | 93 | 29 | 122 | X |
| | 1130 | $1700 | 2/66 | 3075 | 1175 | 4250 | 3600 |
| | 1401 | $6200 | 9/60 | 3740 | 2160 | 5900 | X |
| | 1401-G | $2300 | 5/64 | 705 | 655 | 1360 | X |
| | 1401-H | $1300 | 6/67 | 300 | 200 | 500 | 150 |
| | 1410 | $17,000 | 11/61 | 378 | 202 | 580 | X |
| | 1440 | $4100 | 4/63 | 1970 | 1310 | 3280 | 50 |
| | 1460 | $9800 | 10/63 | 835 | 165 | 1000 | X |
| | 1620 I, II | $4000 | 9/60 | 940 | 500 | 1440 | X |
| | 1800 | $5100 | 1/66 | 398 | 142 | 540 | 320 |
| | 7010 | $26,000 | 10/63 | 150 | 26 | 176 | X |
| | 702 | $6900 | 2/55 | 4 | 0 | 4 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $32,000 | 12/55 | 20 | 2 | 22 | X |
| | 7040 | $25,000 | 6/63 | 60 | 44 | 104 | X |
| | 7044 | $36,500 | 6/63 | 92 | 33 | 125 | X |
| | 705 | $38,000 | 11/55 | 30 | 5 | 35 | X |
| | 7070, 2, 4 | $27,000 | 3/60 | 170 | 90 | 260 | X |
| | 7080 | $60,000 | 8/61 | 78 | 3 | 81 | X |
| | 709 | $40,000 | 8/58 | 3 | 0 | 3 | X |
| | 7090 | $63,500 | 11/59 | 30 | 6 | 36 | X |
| | 7094 | $75,500 | 9/62 | 97 | 3 | 100 | X |
| | 7094 II | $82,500 | 4/64 | 116 | 9 | 125 | X |
| National Cash Register | NCR-304 | $14,000 | 1/60 | 21 | 2 | 23 | X |
| | NCR-310 | $2500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $8700 | 5/62 | 450 | 250 | 700 | 40 |
| | NCR-315-RMC | $12,000 | 9/65 | 85 | 20 | 105 | 30 |
| | NCR-390 | $1850 | 5/61 | 90 | 260 | 350 | X |
| | NCR-500 | $1500 | 10/65 | 1450 | 850 | 2300 | 600 |
| | Century 100 | $2645 | 9/68 | 0 | 0 | 0 | 405 |
| | Century 200 | $7500 | 2/69 | 0 | 0 | 0 | 330 |
| Philco | 1000 | $7010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $40,000 | 10/58 | 13 | 1 | 14 | X |
| | 2000-212 | $52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $7000 | 2/61 | 404 | 207 | 611 | X |
| | RCA 3301 | $18,000 | 7/64 | 75 | 10 | 85 | X |
| | RCA 501 | $14,000 | 6/59 | 80 | 2 | 82 | X |
| | RCA 601 | $35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $4100 | 9/65 | 150 | 64 | 214 | 80 |
| | Spectra 70/25 | $6700 | 9/65 | 93 | 35 | 128 | 55 |
| | Spectra 70/35 | $8000 | 1/67 | 110 | 50 | 160 | 138 |
| | Spectra 70/45 | $23,000 | 11/65 | 190 | 58 | 248 | 76 |
| | Spectra 70/46 | $33,400 | 9/68 | 0 | 0 | 0 | 6 |
| | Spectra 70/55 | $33,300 | 11/66 | 12 | 2 | 14 | 16 |
| Raytheon | 250 | $1200 | 12/60 | 126 | 49 | 175 | X |
| | 440 | $3500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $3200 | 10/65 | 24 | 3 | 27 | X |
| Scientific Control Corp | 650 | $500 | 5/66 | 30 | 0 | 30 | 1 |
| | 655 | $1800 | 10/66 | 50 | 0 | 50 | 25 |
| | 660 | $2000 | 10/65 | 8 | 0 | 8 | 7 |
| | 670 | $2600 | 5/66 | 1 | 0 | 1 | 0 |
| | 6700 | $30,000 | 10/68 | 0 | 0 | 0 | 1 |
| Scientific Data Systems | SDS-92 | $1500 | 4/65 | 125 | 6 | 131 | 2 |
| | SDS-910 | $2000 | 8/62 | 208 | 15 | 223 | 6 |
| | SDS-920 | $2900 | 9/62 | 182 | 8 | 190 | 5 |
| | SDS-925 | $3000 | 12/64 | 56 | 2 | 58 | 4 |
| | SDS-930 | $3400 | 6/64 | 220 | 25 | 245 | 10 |
| | SDS-940 | $13,000 | 4/66 | 30 | 0 | 30 | 20 |
| | SDS-9300 | $8500 | 11/64 | 33 | 2 | 35 | 2 |
| | Sigma 2 | $1800 | 12/66 | 105 | 12 | 117 | 170 |
| | Sigma 5 | $6500 | 8/67 | 26 | 8 | 34 | 55 |
| | Sigma 7 | $12,000 | 12/66 | 18 | 3 | 21 | 20 |
| Standard Computer Corp | IC6000 | $18,000 | 5/67 | 11 | 0 | 11 | 12 |
| | IC4000 | $10,000 | 8/68 | 0 | 0 | 0 | 1 |
| Systems Eng Labs | 810 | $1000 | 9/65 | 22 | 2 | 24 | X |
| | 810A | $900 | 8/66 | 81 | 9 | 90 | 30 |
| | 840 | $1400 | 11/65 | 4 | 0 | 4 | X |
| | 840A | $1400 | 8/66 | 60 | 1 | 61 | 16 |
| UNIVAC | I & II | $25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $21,000 | 8/62 | 77 | 13 | 90 | X |
| | File Computers | $15,000 | 8/56 | 10 | 0 | 10 | X |
| | SS 80, 90 & Step | $8000 | 8/58 | 108 | 74 | 182 | X |
| | 418 | $11,000 | 6/63 | 101 | 51 | 152 | 22 |
| | 490 Series | $30,000 | 12/61 | 193 | 30 | 223 | 35 |
| | 1004 | $1900 | 2/63 | 1880 | 1050 | 2930 | 10 |
| | 1005 | $2400 | 4/66 | 850 | 375 | 1225 | 90 |
| | 1050 | $8500 | 9/63 | 191 | 86 | 277 | 5 |
| | 1101-1105 | $35,000 | 12/50 | 7 | 0 | 7 | X |
| | 1107 | $57,000 | 10/62 | 20 | 8 | 28 | X |
| | 1108 | $68,000 | 9/65 | 91 | 34 | 125 | 95 |
| | 9200 | $1500 | 6/67 | 225 | 55 | 280 | 700 |
| | 9300 | $3400 | 9/67 | 112 | 38 | 150 | 540 |
| | 9400 | $7000 | 5/69 | 0 | 0 | 0 | 110 |
| | LARC | $135,000 | 5/60 | 2 | 0 | 2 | X |
| | | | TOTALS | 45,058 | 21,254 | 66,312 | 19,981 |

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.



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August 26 - September 13, 1968

| | 1968 High | 1968 Low | 3 week Sales in 100's | 3 week High | 3 week Low | Last | 3 week Net Change | 3 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 1/2 | 52 | 3334 | 90 7/8 | 74 5/8 | 85 1/2 | + 5 1/4 | +6.54 |
| American R & D | 207 | 122 1/2 | 401 | 167 | 153 1/2 | 157 1/2 | - 6 1/2 | - 3.96 |
| Ampex Corp. | 37 1/8 | 26 1/2 | 3023 | 35 | 31 5/8 | 33 5/8 | + 1 5/8 | + 5.08 |
| Bunker-Ramo | 21 3/8 | 15 3/4 | 5627 | 18 | 16 | 17 1/4 | + 1/2 | + 2.99 |
| Burroughs | 227 3/8 | 157 | 2169 | 227 3/8 | 205 1/8 | 226 3/8 | +18 1/8 | + 8.70 |
| Collins Radio | 101 1/8 | 53 | 2240 | 67 7/8 | 57 3/4 | 61 1/8 | + 3 1/2 | + 5.70 |
| Control Data | 156 | 124 1/4 | 10242 | 137 3/8 | 124 1/4 | 135 | + 7 | + 5.46 |
| Electronic Assoc. | 27 3/8 | 18 | 1213 | 21 3/4 | 19 1/8 | 21 | + 1 1/2 | + 7.69 |
| General Electric | 100 | 80 1/4 | 3942 | 88 | 82 3/4 | 86 1/4 | + 3 | + 3.60 |
| Honeywell | 139 3/4 | 89 3/8 | 1580 | 122 7/8 | 115 5/8 | 122 | + 7 1/2 | + 6.55 |
| IBM | 375 | 324 | 1813 | 341 1/2 | 332 | 337 1/2 | - 3/4 | - 0.22 |
| Inter. Tel. & Tel. | 59 3/4 | 44 7/8 | 3803 | 57 1/2 | 54 | 54 1/8 | - 1 7/8 | - 3.35 |
| Litton | 104 3/4 | 62 | 2925 | 76 3/4 | 70 3/8 | 74 1/4 | + 2 1/2 | + 3.45 |
| Memorex | 80 | 61 1/2 | 1811 | 79 3/4 | 70 | 75 3/4 | + 3 1/4 | + 4.48 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 962 | 137 | 125 1/2 | 133 3/4 | + 6 3/4 | + 5.31 |
| RCA | 55 | 44 1/4 | 3295 | 48 3/4 | 46 1/8 | 48 5/8 | + 1 1/2 | + 3.17 |
| Raytheon | 54 | 33 1/4 | 7289 | 44 1/4 | 37 1/2 | 40 1/4 | + 1 7/8 | + 4.89 |
| Sanders | 66 1/2 | 41 3/4 | 1529 | 51 3/8 | 48 | 50 1/8 | + 2 7/8 | + 6.08 |
| Scientific Data | 117 1/2 | 85 1/2 | 2650 | 93 | 85 1/2 | 89 5/8 | - 1 7/8 | - 2.05 |
| SCM | 61 1/4 | 35 3/4 | 2630 | 40 3/8 | 35 3/4 | 36 5/8 | - 1 | - 2.66 |
| Singer | 88 7/8 | 62 3/4 | 1237 | 78 | 73 | 77 7/8 | + 4 7/8 | + 6.68 |
| Sperry Rand | 63 3/8 | 41 7/8 | 3847 | 47 5/8 | 45 | 46 3/8 | + 3/8 | + 0.82 |
| Teledyne | 143 7/8 | 90 1/8 | 2705 | 101 1/2 | 94 1/2 | 96 | - 7/8 | - 0.90 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 2.57 | + 3.22 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 66 1/4 | 42 | 190 | 58 | 52 5/8 | 55 3/4 | - 1/2 | - 0.88 |
| Cal Comp. | 53 1/4 | 26 3/4 | 1081 | 41 5/8 | 34 5/8 | 38 1/2 | + 2 7/8 | + 8.07 |
| Clary Corp. | 32 3/8 | 12 1/4 | 1084 | 27 | 21 1/2 | 25 5/8 | + 2 | + 8.47 |
| Computer Applications | 42 5/8 | 20 5/8 | 583 | 25 3/4 | 20 3/4 | 24 1/8 | + 2 3/4 | +12.87 |
| Computer Sciences | 64 3/4 | 31 5/8 | 793 | 46 1/4 | 41 7/8 | 44 1/4 | -- | -- |
| Computing and Software | 61 1/4 | 43 1/2 | 205 | 54 3/4 | 53 1/4 | 53 1/2 | - 3/8 | - 0.70 |
| Data Proc. Fin. & Gen. | 184 | 85 3/4 | 1847 | 100 1/2 | 85 3/4 | 97 1/8 | + 8 5/8 | + 9.75 |
| Digital Equipment | 160 | 95 1/4 | 704 | 128 1/2 | 120 1/4 | 125 | -12 | - 8.76 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 159 | 30 1/8 | 26 1/8 | 28 1/8 | + 3/8 | + 1.35 |
| Granite Computer Leasing | 58 7/8 | 44 | 186 | 49 1/2 | 46 | 46 3/4 | - 1/2 | - 1.06 |
| Greyhound Comp. | 43 1/4 | 27 1/8 | 672 | 31 3/8 | 28 | 28 1/8 | - 3/8 | - 1.32 |
| Leasco | 114 3/4 | 70 3/4 | 2083 | 95 1/8 | 85 1/8 | 92 | - 3 1/8 | - 3.29 |
| Levin-Townsend Comp. Corp. | 58 | 47 5/8 | 1534 | 53 7/8 | 49 1/2 | 52 1/4 | + 3/4 | + 1.46 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 328 | 41 5/8 | 36 1/8 | 36 3/8 | - 5 1/2 | -13.13 |
| Mohawk Data Sciences | 107 1/2 | 77 1/2 | 2451 | 89 7/8 | 79 | 85 1/2 | - 1/8 | - 0.15 |
| Planning Research | 45 1/4 | 28 | 692 | 41 1/2 | 36 1/8 | 40 | + 1 7/8 | + 4.92 |
| Potter Instrument | 38 1/2 | 20 1/2 | 928 | 31 1/4 | 25 1/8 | 26 7/8 | - 5/8 | - 2.27 |
| Randolph Computers | 64 | 34 5/8 | 825 | 46 1/2 | 42 | 42 3/8 | - 3 3/4 | - 8.13 |
| Systems Eng. Labs. | 42 5/8 | 26 3/4 | 1024 | 32 1/4 | 26 3/4 | 31 1/4 | + 3 1/4 | +11.61 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 0.18 | + 0.99 |

| OVER-THE-COUNTER | 1968 High Bid | 1968 Low Bid | Sept. 13 Bid | Sept. 13 Asked | 3 weeks ago Bid | 3 week net change Bid | 3 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 33 1/2 | 14 1/2 | 25 | 27 | 27 | -2 | - 7.47 |
| Aries Corp. | 24 | 15 1/2 | 17 | 18 | 18 1/2 | -1 1/2 | - 8.11 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 20 1/4 | 21 1/4 | 15 | +5 1/4 | +35.00 |
| Computer Usage | 62 | 28 1/2 | 32 | 33 1/2 | 37 1/2 | -5 1/2 | -14.67 |
| Cyber-tronics | 19 | 11 1/2 | 12 1/4 | 13 | 13 1/2 | -1 1/4 | - 9.26 |
| Data Products | 22 | 13 | 17 1/4 | 17 5/8 | 15 3/4 | +1 1/2 | + 9.52 |
| Digitronics | 27 1/2 | 16 1/2 | 20 | 21 | 23 | -3 | -13.04 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 17 1/8 | 17 5/8 | 18 1/2 | -1 3/8 | - 7.43 |
| Electronic Memories | 57 1/2 | 32 3/4 | 40 3/4 | 41 1/2 | 41 1/2 | - 3/4 | - 1.81 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 16 | 16 1/2 | 13 3/4 | -2 1/4 | -16.36 |
| Informatics, Inc. | 68 | 32 | 62 1/2 | | 64 | -1 1/2 | - 2.34 |
| LMC Data, Inc. | 16 | 7 | 9 1/4 | 10 | 8 3/4 | + 1/2 | + 5.71 |
| Management Assistance | 16 1/8 | 9 1/4 | 11 3/8 | 11 3/4 | 10 1/4 | +1 1/8 | +10.98 |
| Optical Scanning Corp. | 138 | 71 | 101 | 105 | 100 | +1 | + 1.00 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 86 | 87 1/2 | 95 | -9 | - 9.47 |
| Standard Computers | 55 | 30 | 44 1/2 | 46 1/2 | 45 1/2 | -1 | - 2.20 |
| Tally Corp. | 51 1/2 | 35 | 43 | 45 | 44 | -1 | - 2.27 |
| TBS Computer Centers Corp. | 21 3/4 | 12 1/4 | 13 3/4 | 14 3/4 | 15 1/2 | -1 3/4 | -11.29 |
| University Computing | 158 | 57 | 156 | 160 | 143 | +13 | + 9.09 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" OCTOBER 14,1968 • VOL.4,NO.5 P.J.McGOVERN,EDITOR

A fresh look

## STUDY REVEALS THAT "DANGEROUS" SIGNS REALLY POINT UPWARD AS IBM APPROACHES A CRITICAL POINT IN COMPUTER INDUSTRY HISTORY

Quite a few Wall Streeters who watch computer stocks are expressing concern over IBM, a company rated by the owners of its shares as the most valuable company in the world. Reasons mentioned are:

- IBM's backlog is down, as pointed out in the Mid-year Review issue of this newsletter (EDP/IR,Jul.31,1968).

- The order rate for new IBM systems is at the lowest point in years, although the actual magnitude of IBM's backlog is just slightly below its historic high of two years ago and exceeds IBM's expected shipments for next year.

- The Justice Department has confirmed that it is looking into IBM's Rair (Remote Access/Immediate Response -- see EDP/IR,Aug.29,1968) services in the light of IBM's legal requirements under the 1956 Consent Decree.

Because of these facts, and because of the unrest and uncertainty they generate, individual investors and institutions have put IBM's stock under a rare spell of selling pressure: The purchase price for a share of IBM's common stock has held steady.

During this time, EDP/IR has been asked questions by many of its readers as to what is going on. We frankly admit that we are not in a position to judge the stock market and the methods it uses to evaluate the worth of a particular company's equity securities; we do, however, profess a reasonable understanding of the information processing industry. During the past weeks, therefore, we have conducted an intensive re-evaluation of the EDP industry's major manufacturer -- the International Business Machines Corp.

The results of this study by no means point to any major downturns; indeed, they indicate that things look pretty good for the computer industry and for IBM. The report that follows summarizes our analysis of IBM at what could be considered a critical point in the computer industry -- almost five years after the announcement of System/360.

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## The industry and its Giant

It doesn't matter how you look at it. The computer industry consists of IBM . . . and the "others." IBM's shipments have never dropped below 65% of the industry's total, and usually they are higher. This year, for example, IBM will ship an estimated $5.2 billion worth of computers, just over 75% of EDP/IR's estimated $6.9 billion of worldwide computer shipments by U.S.-based manufacturers. Also, about 70%, by value, of all U.S.-made computers currently installed bear the IBM nameplate, and this percentage is expected to hold fairly constant.

Because of this situation, an economic study of the computer industry requires a study of IBM; likewise, a study of IBM's computer business is, to all intents and purposes, a study of the computer industry. This is illustrated quite clearly in Chart I, which shows the total value, worldwide, of computers made by U.S.-based companies, and the total value of IBM computers installed worldwide.

[Note: The charts in this issue are plotted on a semi-logarthmic scale, which makes it easier to compare values growing at exponential rates. This charting technique was explained in the Mid-year Review issue (EDP/IR,Jul.31,1968).]

There seems to be a definite cyclical pattern for shipments and backlog, with each moving along similar paths, offset by one to two years. There is no assurance that history will be repeated, by the indications at this point in time point to the continuation of this cyclical effect . . . the cycles becoming more damped with each succeeding wave.

The growth in the value of installed computers, on the other hand, has been quite steady. Indeed, the only real break in this smooth curve comes in the 1965-1966 period -- the period after which IBM's System/360 was announced but before volume shipments had caught up with demand. The shipments during this period, also, were much more for replacements than is normal.

This steady growth in the total value of installed equipment shows up very clearly in the record of IBM's revenues and earnings. There are slight variations, to be sure. But the curves for both these values are extremely close to the 15% line for revenues and the 17% line for earnings (see Chart II). In retrospect, if not in actuality, it looks as if IBM has planned its every major move to keep revenues and earnings growing at these constant percentages.

The big question, then, is whether or not IBM can continue to grow at the rates it seems to have established. Considering the resources and the degrees of freedom that IBM has in the market, we see no reason why it can't continue its 15%-a-year growth for the foreseeable future. Here is our reasoning:

## Evolving computer family

It has been over four-and-a-half years since IBM announced System/360, and by historical standards (for what they are worth) one might expect a major new product announcement in the near future. Also, the shipment cycles shown in Chart I would also indicate that new equipment is in the offing. It may well be.

We understand that two new models of System/360, probably to be called the 360/35 and the 360/45, are virtually ready for introduction. They will probably be announced early in 1969, for delivery in 1970 or later. These central proces-



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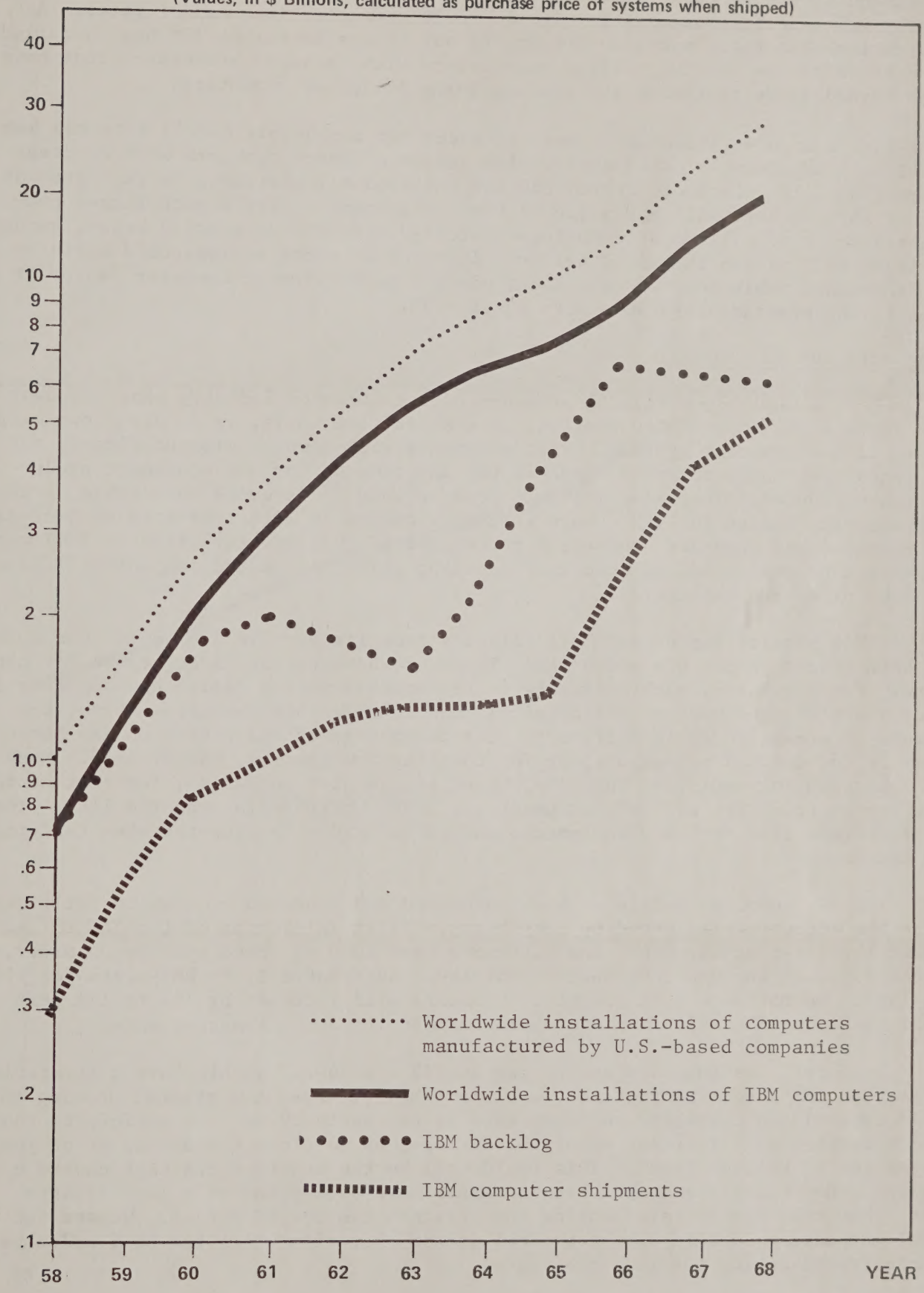
CHART I

WORLDWIDE INSTALLATIONS, SHIPMENTS, AND BACKLOG OF IBM COMPUTER SYSTEMS

(Values, in $ Billions, calculated as purchase price of systems when shipped)



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sors will be compatible with the earlier members of the family, and will be an extension of the concept first displayed in the announcement of the 360/25 -- a better price/performance system with improved communications capabilities. An indication that these machines are on the way is the fact that IBM has curtailed production of the 360/30, filling many orders with revamped processors that have been turned in by customers who are upgrading to larger computers.

Such a move -- introducing more advanced but compatible models into the same family of computers -- makes sense. IBM suffered severe problems with customer support when it introduced System/360 and required all customers to reprogram or not be able to take full advantage of the new systems. With a much larger customer base -- $7 billion of computers installed when 360 deliveries began, versus at least $23 billion installed before deliveries of a new system could begin -- it is inconceivable that IBM would introduce a major line of computer equipment that is not program compatible with System/360.

Shipments and backlog

It is a well-known fact to students of the computer industry that the best and fastest way to increase profits, on a short-term basis, is to slow down shipments of new computer systems. When shipments slow down, equipment already out on rental continues to provide income yet investments for new equipment production are reduced. This also works in reverse, and it is quite noticeable in the accompanying charts for IBM: When shipments zoomed in 1966, the rate of increase in revenues and earnings dropped; a recurrence of the same situation in 1967 was prevented by the increased amount of outright sales to leasing companies. (Leasing will be discussed shortly.)

IBM's backlog has dropped off slightly from its high in 1965, and this seems to bother some people who study IBM. There is, however, no large reason for concern. For one thing, such a drop is to be expected when a family of computers is four years old and much of the original rush to order has subsided. Also, the nature of orders today is different. The percentage of the orders on the books that is for central processors, or for complete new systems, has dropped. Much of the computing equipment that IBM, or other computer companies, for that matter, now has on order is "add-on" equipment . . . new peripherals, and the like. There is less lead time for such equipment, and it is harder to pinpoint when tallying up orders.

The new computer models -- both announced and expected -- seem to fit right into the situation indicated by the charts. First deliveries of the 360/25 begin about the first of the year, and with more than 2000 of these systems on order, these first of the new 360s should contribute substantially to shipments for IBM in 1969. We estimate that computer shipments will increase by 10% to 12% next year, and that IBM will maintain approximately its current market share.

Likewise, the announcement of the 360/35 and 360/45 should have a favorable effect on IBM's backlog figures . . . starting, perhaps, the gradual upswing that will foretell an increased shipment rate in the early 1970s. We anticipate that IBM's backlog will increase about 10% during 1969 to close the decade at or just below the $7 billion level. This could well be the start of the next upward cycle on the order curve --a cycle that increases more slowly and at a less frantic rate than that demonstrated during the previous two upward surges. We see the cycle repeating, but in a more gradual manner that eliminates the 50+% order rates demonstrated during the last two years.



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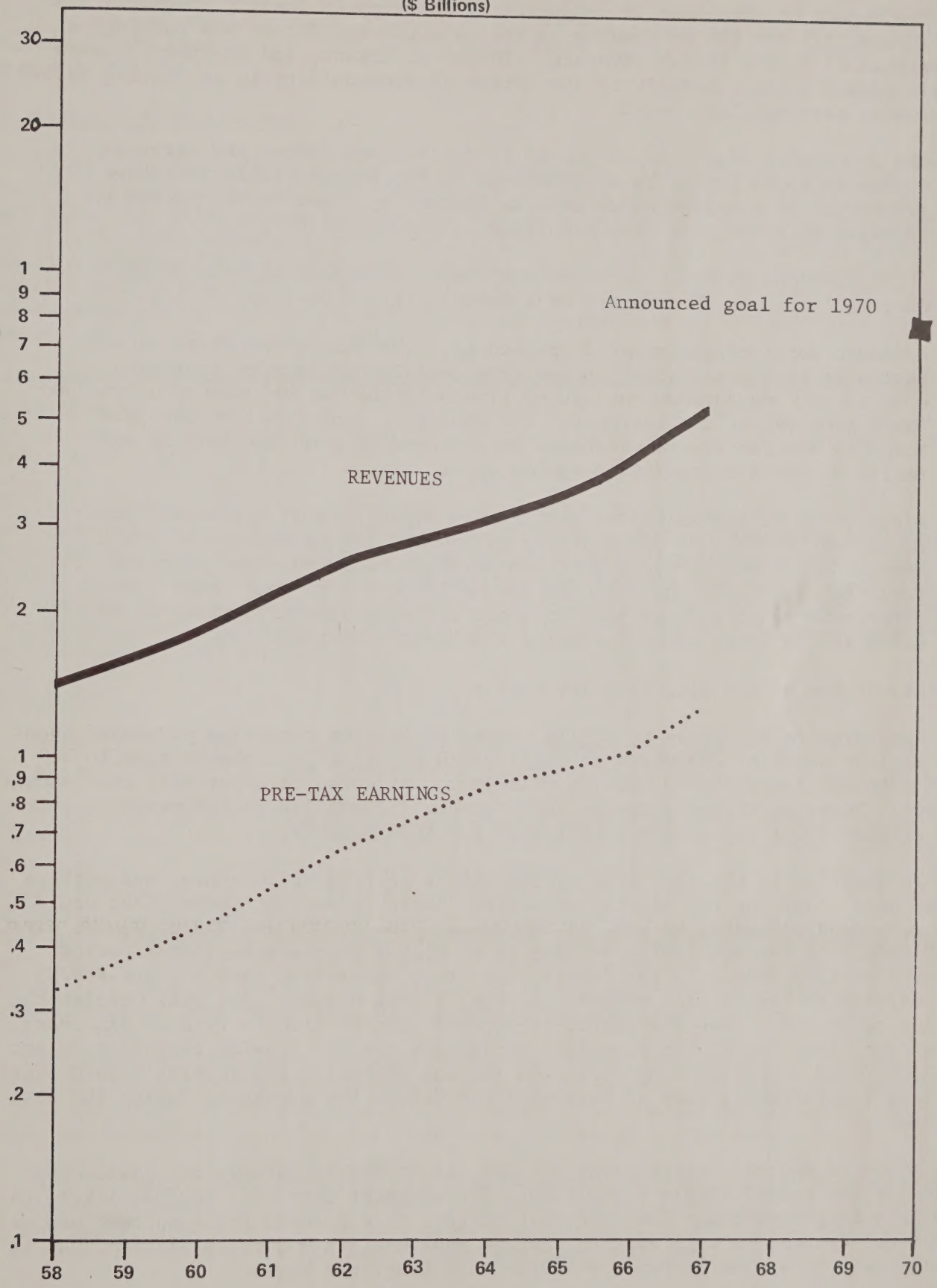
CHART II

IBM GROSS REVENUES AND PRE-TAX EARNINGS

($ Billions)



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The impact of third-party leasing

The impact of purchases of computers by third-party leasing companies has been substantial for IBM -- tending to increase current income and earnings at the expense of future rental payments. Thomas J. Watson, IBM chairman, summed up this impact quite concisely in his letter to stockholders in announcing record nine-months earnings last week:

> *The abnormally high rate of growth in IBM's gross income and earnings continues to be primarily attributable to the substantially increased proportion of outright sales of data processing products as opposed to rentals, which we have been experiencing since mid-1967.*
>
> *. . . outright sales, unlike rentals, have the effect of increasing current income at the expense of income in future periods.*
>
> *Although total gross income increased by 30.9% during the first nine months of this year, gross income from rentals and service increased only 15.8%. We believe the latter figure is the better measure of the basic progress of the business. The unusually high level of outright sales is due largely to purchases by independent computer leasing companies of IBM's System/360 computer line.*
>
> *Although it is impossible to predict the future, we do not expect such purchases to continue indefinitely at present levels because of the magnitude of the aggregate purchases already made, together with the fact that System/360 has been on the market for over four years. Past experience would suggest that purchase activity generally tends to decline in the later years following a product's introduction.*

We couldn't sum up the situation any better.

According to estimates by EDP/IR, computer leasing companies purchased about $450 million worth of computers in 1967. This amount will probably rise to between $700 million and $750 million this year, then drop to about half that amount in 1969. These purchases increase IBM's income and profits in the years in which they are made, but reduce the rental base for future years.

In addition to the fact that System/360 is getting up in years, and perhaps not so good a buy for the leasing companies, there is another factor that could tend to reduce purchases by leasing companies. The 360/25 and 360/85 -- the first "new" models in the 360 family -- came in at higher purchase-to-rental ratios than the earlier models in the family, and it is understood that the new 360/35 and 360/45 will have ratios equally as high, if not higher. And this worries the leasing companies. When the rental-to-purchase payout time is five or six years, rather than four years, the financial advantages for the leasing companies is not nearly so good. Anticipating this, the leasing companies are looking toward other computer manufacturers such as Honeywell and Univac for purchases during the next few years.

There is another factor going for IBM, if it indeed follows the philosophy of adding new models within System/360. The computer user will be less likely to make an outright purchase (or, for that matter, sign a lease for more than one or two years) because he will want to upgrade equipment with more regularity than is possible with a system he owns or leases on a long-term basis.



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The outlook, therefore, considering a likely decrease in purchases by both third-party leasing companies and other IBM users, is that the IBM revenue chart will return more closely to the 15% growth curve that seems to be planned and desired. ("We believe the latter figure [15.8%] is the better measure of the basic progress of the business.") This will reduce IBM's excess profits and make its top people happier!

The impact of time sharing

There's no doubt that, during the next few years, time sharing and other types of Rair computing will have considerable impact on IBM . . . both in outright equipment sales and as part of the company's business. Following a recent complaint by some independent time-sharing service companies, the Justice Department is examining IBM's role in the business. There is a genuine question as to whether the 1956 Consent Decree -- which forced IBM to get out of the service bureau business and establish the Service Bureau Corporation -- is applicable to time sharing. Only time will tell.

But it is certain that IBM, either through its Information Marketing Division or, if need be, through SBC, will be an important factor in the time-sharing and Rair market. It announced Call/360: BASIC a few months ago, and is aggressively pushing it.

It is interesting that, according to recent studies by the International Data Corporation, publisher of EDP/IR, time sharing is a money-absorbing venture for the first few years. Almost by plan (more likely by hapstance), IBM is going into time sharing in a big way just at the time that it has excess profits from sales to leasing companies. By quickly building up its time-sharing business to equal or exceed that now offered by General Electric, IBM could absorb some of its "abnormally high" earnings.

The outlook

From our analysis, we must conclude that IBM will continue to grow -- at a 15% rate or better -- for the foreseeable future.

Presently, IBM is "plagued" with too high a rate of profits; certainly, in the years to come, the company will feel pressures from the other direction. But, on balance, IBM is simply bigger than these "minor" problems. It has been through economic downturns . . . and a massive new product introduction. Yet, over the past 10 years, IBM's earnings have increased an average of 17% annually, and revenues more than 15%. Indeed, implementation of these results may be quite difficult (and we are the first to admit that this will probably be the case), but the results themselves reveal IBM's highly effective long-range planning and resource allocation judgements that have produced its 15% growth curve.

Over the next few years, at least, a similar curve can well be anticipated. We project that shipments of computers will slow to about a 10% to 12% growth for the next two years, although there will be enough speed-up during the early 1970s to give an average 15% to 18% growth over the 1968-to-1975 time span.

If this is the case, then IBM's progress will be parallel, since it virtually sets the industry average. And with this increase in shipments over each of the next few years, IBM is virtually assured of maintaining its 15% growth because of the gigantic rental base it has built . . . and keeps building.



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| | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 1/2 | 52 | 1310 | 88 5/8 | 84 1/4 | 86 1/8 | +5/8 | +0.73 |
| American R & D | 207 | 122 1/2 | 1424 | 160 3/4 | 150 | 156 | -1 1/2 | -0.95 |
| Ampex Corp. | 37 1/8 | 26 1/2 | 2350 | 35 3/8 | 33 1/2 | 34 7/8 | +1 1/4 | +3.72 |
| Bunker Ramo | 21 3/8 | 15 3/4 | 3706 | 18 1/2 | 16 1/2 | 17 1/8 | -1/8 | -0.72 |
| Burroughs | 239 5/8 | 157 | 1073 | 239 5/8 | 224 5/8 | 227 1/8 | +3/4 | +0.33 |
| Collins Radio | 101 1/8 | 53 | 1009 | 65 5/8 | 61 1/4 | 64 1/2 | +3 3/8 | +5.52 |
| Control Data | 156 | 124 1/4 | 5341 | 135 3/4 | 127 | 128 | -7 | -5.19 |
| Electronic Assoc. | 27 3/8 | 18 | 1241 | 23 | 20 1/8 | 22 1/8 | +1 1/8 | +5.36 |
| General Electric | 100 | 80 1/4 | 2943 | 89 1/4 | 85 | 85 5/8 | -5/8 | -0.72 |
| Honeywell | 139 3/4 | 89 3/4 | 752 | 125 7/8 | 120 1/2 | 124 3/4 | +2 3/4 | +2.25 |
| IBM | 375 | 324 | 1788 | 337 1/2 | 330 | 332 1/4 | -5 1/4 | -1.56 |
| ITT | 59 3/4 | 44 7/8 | 3555 | 57 1/8 | 52 1/2 | 57 1/8 | +3 | +5.54 |
| Litton | 104 3/4 | 62 | 2126 | 78 1/2 | 74 1/4 | 76 3/4 | +2 1/2 | +3.37 |
| Memorex | 89 | 61 1/2 | 2398 | 89 | 74 7/8 | 88 | +12 1/4 | +16.16 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 843 | 138 1/4 | 132 | 134 3/4 | +1 | +0.75 |
| RCA | 55 | 44 1/4 | 2677 | 49 7/8 | 47 1/2 | 49 3/4 | +1 1/8 | +2.31 |
| Raytheon | 54 | 33 1/4 | 4241 | 47 3/8 | 40 | 45 1/4 | +4 | +9.93 |
| Sanders | 66 1/2 | 41 3/4 | 1273 | 54 1/2 | 50 | 51 1/8 | +1 | +1.99 |
| Scientific Data | 117 1/2 | 84 1/2 | 2593 | 90 7/8 | 84 1/2 | 88 1/8 | -1 1/2 | -1.67 |
| SCM | 61 1/4 | 35 3/4 | 4801 | 41 3/4 | 38 5/8 | 39 3/4 | +3 1/8 | +8.53 |
| Singer | 88 7/8 | 62 3/4 | 618 | 78 3/8 | 75 | 76 1/2 | -1 3/8 | -1.77 |
| Sperry Rand | 63 3/8 | 41 7/8 | 4258 | 47 1/2 | 45 1/8 | 46 3/8 | -- | -- |
| Teledyne | 143 7/8 | 90 1/8 | 2307 | 105 | 92 | 101 1/8 | +4 1/8 | +4.30 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | +1.07 | +2.53 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 66 1/4 | 42 | 165 | 55 3/4 | 52 | 54 1/2 | -1 1/4 | -2.24 |
| Cal. Comp. | 53 1/4 | 26 3/4 | 598 | 40 | 38 1/8 | 39 7/8 | +1 3/8 | +3.52 |
| Clary Corp. | 32 3/8 | 12 1/4 | 367 | 26 | 23 7/8 | 24 3/8 | -1 1/4 | -4.87 |
| Computer Applications | 42 5/8 | 20 5/8 | 306 | 25 | 22 5/8 | 23 3/8 | -3/4 | -3.10 |
| Computer Sciences | 64 3/4 | 31 5/8 | 891 | 55 3/4 | 44 1/4 | 49 1/2 | +5 1/4 | +11.86 |
| Computing and Software | 63 | 43 1/2 | 309 | 63 | 53 3/4 | 62 | +8 3/4 | +16.36 |
| Data Proc. Fin. & Gen. | 184 | 85 3/4 | 1227 | 114 1/4 | 98 | 109 3/8 | +12 1/4 | +12.61 |
| Digital Equipment | 160 | 95 1/4 | 984 | 141 3/4 | 124 1/2 | 139 1/2 | +14 1/2 | +11.60 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 88 | 29 1/2 | 27 1/4 | 29 | +7/8 | +3.11 |
| Granite Computer Leasing | 58 7/8 | 44 | 236 | 51 | 46 | 49 1/4 | +2 1/2 | +4.70 |
| Greyhound Computer | 43 1/4 | 27 1/8 | 723 | 33 3/4 | 28 1/4 | 33 3/8 | +5 1/4 | +18.64 |
| Leasco | 117 | 70 3/4 | 3408 | 117 | 92 5/8 | 116 | +24 | +26.09 |
| Levin-Townsend Comp. Corp. | 60 | 47 5/8 | 3263 | 60 | 49 1/4 | 60 | +7 3/4 | +14.83 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 364 | 40 5/8 | 33 7/8 | 36 3/8 | -- | -- |
| Mohawk Data Sciences | 107 1/2 | 71 3/4 | 2946 | 85 1/2 | 71 3/4 | 78 1/8 | -7 3/8 | -8.63 |
| Planning Research | 45 3/4 | 28 | 506 | 45 3/4 | 40 | 45 3/4 | +5 3/4 | +14.38 |
| Potter Instrument | 38 1/2 | 20 1/2 | 555 | 30 5/8 | 26 3/4 | 30 1/4 | +3 3/8 | +12.55 |
| Randolph Computers | 64 | 34 5/8 | 1002 | 49 | 42 1/8 | 47 3/4 | +5 3/8 | +12.68 |
| Systems Eng. Labs. | 42 5/8 | 26 3/4 | 643 | 31 5/8 | 28 1/4 | 29 1/4 | -2 | -6.41 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | +4.44 | +7.25 |

| OVER-THE-COUNTER | 1968 High Bid | 1968 Low Bid | September 27 Bid | September 27 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 33 1/2 | 14 1/2 | 27 | 29 | 25 | +2 | +8.00 |
| Aries Corp. | 24 | 13 1/2 | 13 1/2 | 15 | 17 | -3 1/2 | -20.59 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 21 1/4 | 22 1/4 | 20 1/4 | +1 | +4.93 |
| Computer Usage | 62 | 28 1/2 | 31 | 32 1/2 | 32 | -1 | -3.13 |
| Cyber-tronics | 19 | 11 1/2 | 13 1/2 | 14 1/4 | 12 1/4 | +1 1/4 | +10.20 |
| Data Products | 22 | 13 | 19 | 19 3/8 | 17 1/4 | +1 3/4 | +10.14 |
| Digitronics | 27 1/2 | 16 1/2 | 19 1/2 | 20 1/2 | 20 | -1/2 | -2.44 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 16 1/4 | 16 3/4 | 17 1/8 | -7/8 | -5.11 |
| Electronic Memories | 57 1/2 | 32 3/4 | 44 1/4 | 45 1/2 | 40 3/4 | +3 1/2 | +8.59 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 15 | 15 1/2 | 16 | -1 | -6.25 |
| Informatics, Inc. | 68 | 32 | 55 | ** | 62 1/2 | -7 1/2 | -12.00 |
| LMC Data, Inc. | 16 | 7 | 8 1/2 | 9 1/4 | 9 1/4 | -3/4 | -8.82 |
| Management Assistance | 16 1/8 | 9 1/4 | 10 1/2 | 10 7/8 | 11 3/8 | -7/8 | -7.69 |
| Optical Scanning Corp. | 138 | 71 | 107 | 111 | 101 | +6 | +5.94 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 84 1/2 | 86 1/2 | 86 | -1 1/2 | -1.74 |
| Standard Computers | 55 | 30 | 48 | 50 | 44 1/2 | +3 1/2 | +7.86 |
| Tally Corp. | 51 1/2 | 35 | 39 1/2 | 41 | 43 | -3 1/2 | -8.14 |
| TBS Computer Centers Corp. | 21 3/4 | 12 | 12 | 13 | 13 3/4 | -1 3/4 | -12.73 |
| University Computing | 167 | 57 | 163 | 168 | 156 | +7 | +4.49 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" OCTOBER 30,1968 • VOL.4,NO.6 P.J.McGOVERN,EDITOR

## IBM, IN AN ACTIVE WEEK, REPORTS DEVELOPMENTS APPARENTLY DESIGNED TO STEM LEASING ACTIVITY AND SIDESTEP ANTI-TRUST ACTION

During the past week or so, the most significant news for the computer industry has come from the major company in the industry. IBM has made the following moves, or non-moves:

- Time-sharing services, which had been handled by the Information Marketing Dept. of IBM's Data Processing Div., have been transferred lock, stock, and leader to The Service Bureau Corp., a wholly owned subsidiary.

- Maintenance prices for a large number of IBM computer products were both raised and lowered on an item-by-item basis; after pressure from third-party computer leasing companies, IBM withdrew all the "maintenance service charge adjustments."

- As suspected earlier (EDP/IR, Oct.14,1968), IBM confirmed that the 360/30, 40, 50, 75, and some models of the 360/20 family are now in "limited new production" and that, therefore, a "tax qualifying order cannot be accepted."

- IBM announced plans for a "specialized marketing organization, called the Commercial Region," that will provide "marketing services to the finance, insurance, communications, utilities, and transportation industries in most major metropolitan areas." This tends to confirm the direction suggested about a year ago (EDP/IR,Oct.19,1967).

These various actions don't all fit together into a neat little package with one overriding message. Indeed, the announcements and confirmations came from different levels within IBM, and the timing of them could be coincidental, although we doubt this. There are, however, certain themes that seem to run consistently in the background, becoming crystal clear from time to time.

There is implied, obviously, certain pressures against continued high levels of purchases by leasing companies. This probably was one reason behind the attempted hike in maintenance charges. The production slowdown is one more indication that IBM is tooling up for large deliveries of the 360/25 and its unannounced big brothers, the 360/35 and 360/45. In the other moves, the threat of anti-trust action appears to be anticipated.

Here is a discussion of each of these developments and our analysis of how they seem to fit into IBM's "Opus 1968."

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TIME SHARING MOVES TO SERVICE BUREAU CORP.

Under the Information Marketing Department, conversational time sharing and Datatext -- IBM's Rair computing services (see EDP/IR, Aug. 29, 1968 for a discussion of Remote Access/Immediate Response computing) -- have been an infinitesimal part of the company's Data Processing (DP) Division, though a portion which is expected to grow rapidly.

IMD has an estimated 150 salesmen backed by an additional 150-man software development group, and in 1967 had an estimated $10 million in sales. Until earlier this year, all IMD services were being offered on second-generation computers, and weren't significantly competitive with other commercial time-sharing services. In June, however, IBM announced its Call/360 time-sharing services -- based on special programs worked out by IMD -- using System/360 computers.

Many time-sharing service users reacted favorably to IBM's "product." Some of the competitive time-sharing services demanded the same software package, accused IBM of unfair pricing, and stirred up enough commotion to get the Justice Department to initiate a study of time sharing at IBM. This was warranted, it was claimed, under the provisions of the 1956 consent decree in which IBM agreed to set up The Service Bureau Corp. and to keep out of the service bureau business under the IBM name. The question that was raised: "Is the offering of time sharing a true service bureau operation, or is it simply the selling of computer time?" IBM apparently decided to sidestep the issue: It reported that the anti-trust action was taken into consideration in the timing of the announcement.

The initial reaction from independent time-sharing service organizations was generally one of relief. Upon hearing about the announcement, the typical IBM competitor said: "SBC is not a dynamic competitor, and they won't be able to use the IBM name, so this should be good for the competitive situation." For a little while ... maybe ... is EDP/IR's comment.

SBC won't be the same much longer.

It is common talk within IBM that a full-fledged Data Processing Div. man will take the SBC helm within a few months. Add to this the fact that L. E. ("Sinbad the Sailor") Donegan, Jr., formerly director of IBM's Information Marketing Dept., "has been elected vice president of SBC and will head the transferred department in that organization." It looks as if personnel within SBC may well be asked to perform in the prescribed manner or to leave the environment. Initially, some of the people within IMD were unhappy with the new situation; this initial reaction is cooling, and it may well be that they should be elated.

IMD's role within SBC

Operating within SBC -- with its 350-odd salesmen and managers -- the time-sharing group has some definite advantages:

- Sales coverage. SBC has over 100 offices and an estimated 180 to 200 computers. Revenues for 1967 are estimated to be at the $80 million to $90 million level.



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- Established customers. As the largest of the nation's service bureaus, SBC has an established customer base and a sizeable group experienced in customer programming and systems analysis.

- Flexible product mix. With time sharing to offer, SBC now can offer customers the combination of on-line program preparation and off-line batch processing.

- New services. IMD, we understand, has many products just about ready for implementation. With no further tie to IBM terminals, and with none of the consent decree restrictions, the organization is now in a position to compete more strongly than from within the ranks of IBM proper.

Thus, on the surface, the transfer of IMD looks like an attempt to gain a step on Justice ... to say "it's your move," as it were. And this may well be what prompted the timing of the announcement. But there are definite business and competitive advantages to the move. It could well be that IBM -- through SBC -- is saying that now is the time to start staking out a claim to a major share of the Rair market.

Although IMD presently constitutes a small percentage of SBC's revenues, it can well be expected to lead the dominant role within a few years. Donegan is widely considered a man headed toward the top in IBM Corp., and it appears that he has his opportunity all cut out. EDP/IR estimates the amount spent on Rair services during 1969 will be some $180 million, and that some $130 million or so of this is potentially available to SBC with the type services it now has. A year or so from now, we may well see a changed SBC and a new dominant force in the Rair market.

## IBM AND THE LEASING COMPANIES

There is every indication that IBM, through many of its actions, is determined to reduce the effect that computer purchases by third-party computer leasing companies have on the company's over-all planning.

Last week, therefore, when IBM announced its maintenance service charge adjustments, the move looked exactly like a further step in this direction: Charges were increased some 20% for most System/360 and 1800 central processors, with some peripherals for these machines getting as much as a 70% hike; at the same time, the charges were reduced about 20% for older 7000 series mainframes and about 5% for the related peripheral equipment.

The increases announced by IBM were not a flat percentage figure across the board, however. They were announced on a model-by-model basis -- 101 types of machines had charges increased, 40 saw them reduced, and for 178 no changes were made -- suggesting that the company had based the maintenance charge changes on an extensive study of customer records, which surely the company has. Thus, when the charge increases were announced, it could not definitely be said with any amount of certainty that it was a move against the leasing companies.

A few days later, however, IBM announced that it had withdrawn the adjustments because "some leasing companies have now reported that they have fixed price contractual agreements with some of their customers, and that the fixed prices include maintenance service provided by the IBM Company."



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IBM went on to defend its original announcement, which it said was made only "after an item-by-item examination of previous monthly maintenance charges, and that increased costs made the adjustments necessary." It pointed out that it "could not be aware of the terms of the leasing companies' individual contracts with their customers," and that "these leasing companies made these arrangements despite the fact that IBM's maintenance agreements, like most contracts subject to inflationary trends, clearly specify that IBM's maintenance prices are subject to change upon three months advance notice." But IBM withdrew all the charge adjustments ... those which went up and those which went down.

It appears to EDP/IR that IBM either made its original move irrationally in an effort to bring pressure on the leasing companies (which seems unlikely), or that IBM allowed pressure from the leasing companies to force it to back down from a very defendable position (because of implied anti-trust pressure?). To the logical observer, one of these two moves doesn't fit.

An alternative way out with new computer models?

IBM's surest method of restraining the growth of third-party leasing companies is to make its equipment unattractive for them to purchase. It can't do this, legally, under the consent decree ... yet it can.

Most models of System/360 have been put into "limited new production"... a descriptor that means that a customer (leasing company or not) will not be guaranteed that the "new" computer he receives will be of all new construction (it may be a refitted model that previously was traded in by another customer) and therefore that it will qualify for investment tax credit. To many people purchasing computers, including leasing companies, this factor can be important.

In addition, it looks as if -- soon -- the lineup of System/360 will be the 25, 35, 45, 65, and 85 -- most of which will have a 55-to-1 or higher purchase-to-rent ratio. (Accompanying the announcement of the 35 and 45 may well be a disclosure that IBM has increased its depreciation period from four years to five or six years.) Computers priced like this will have much less attraction for the third-party leasing companies.

It is generally believed that IBM must introduce something new by the first of the year or shortly thereafter. The situation we have described above is our thinking on what the industry giant will do. Such a move will quickly begin to change IBM's backlog back more toward a systems-oriented mix, and will breathe new life into a family of computers that in all likelihood will last into the early 1970's or later.

When the announcement comes, it may well be accompanied by some public relations jargon that will give the new models a popular fanfare, but EDP/IR is convinced that IBM's new computer products announced next year, and the next, will be completely compatible with System/360 and will be what we have previously described as "transition generation" computers.

AN ANTI-ANTI-TRUST MOVE?

There was another quiet announcement by IBM last week ... one that received little play in the press but one that we consider equally as important as the ones described above. IBM announced plans for a "specialized marketing organization, called the Commercial Region."



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This organization will provide marketing services to the finance, insurance, communications, utilities, and transportation industries in most of the country's major metropolitian areas, and thus become a very important element in IBM's Data Processing Division. The group will be based in Princeton, N.J., but will be nationwide in scope.

In describing the organization's formation, IBM points out that the industries served by the Commercial Region are rapidly expanding their use of data processing equipment in advanced areas, and many of them have requirements that are national in scope. "By pooling the talents of specialists serving related industries, we can better apply IBM technical know-how to help customers across the country solve their data processing problems."

EDP/IR considers this move important, as it suggested a year ago (EDP/IR, Oct. 19, 1967) in describing the possible implications of the formation of a "management committee." What we said at that time seems a valid appraisal:

> There is talk about IBM's establishing industry specialization divisions within its DP Group . . . If this step were taken, there would be divisions for such areas as insurance, banking, various phases of manufacturing, retailing, transportation, and utilities. There would, also, obviously be a division for national accounts or conglomerates, and perhaps one for small business.
>
> IBM, in a sense, has a prototype of this type operation already going. It's called GEM, the Government, Education, and Military marketing group for commercial computers.
>
> From a management point of view, these divisions could be operated independently just as Service Bureau Corp., although SBC is required to be handled in this manner by the 1956 consent decree. Operated this way, these "specialists" companies would each have a rather small share of the overall data processing market and IBM, which is now operated as a single company and controls over 70% of the data processing market, would perhaps avoid anti-trust action.

There's no way, at this point, of knowing how the Commercial Region will fare If it succeeds, there's every indication that it may well be broken down into separate operating groups as described last year. We definitely think that it will make life easier for many IBM salesmen. Most of them already specialize in a particular industry or even a specific company. The move obviously gives IBM better control in a rapidly growing industry, and it also will tend to build up competitive groups within IBM . . . building an organization that possibly will come less under scrutiny by the Justice Department.

## WHY ALL THE ACTION?

EDP/IR can offer no particular reason for the timing of the various announcements described in this issue. Thoughts naturally turn to politics at this season in this year, but we can find nothing to suggest that there is anything political involved in IBM's announcements so near an election. As a matter of fact, many far-reaching developments seem to seep out of IBM late in every year.

It does seem clear to us, however, that IBM has definitely decided to take every action possible to stem the rapid growth -- the high level of purchases --



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of the third-party computer leasing organizations. It also seems quite obvious that IBM is determined -- after biding its time for several years and making almost a token observance in the marketplace -- to stake out its claim in the Rair or time-sharing market. Also, and perhaps most important, it seems quite clear that IBM apparently is doing everything possible to prevent any formal anti-trust action from the Justice Department. It is interesting, and a reflection of IBM's corporate planning, that most of the company's "anti-anti-trust" moves also appear to be the best business decisions.

In evaluating any actions or moves by IBM, it is important to take several things into consideration:

- IBM already is the most highly valued (by investors) company in the world;
- IBM ranks quite high (seventh) on the listing by sales of industrial companies, and it moves up every year or so;
- IBM, not-too-long-from-now, will definitely be the largest company in the world, by any measure.

In its almost "monopoly-like" actions that at least are indicative of its market strength, IBM has laid the framework on which a viable computer industry could grow. Indeed, without a leader like IBM there is every indication that the computer industry would be nowhere the size it currently is.

This industry -- and its leader -- is "just entering its infancy," and IBM with its size and protective umbrella makes possible this healthy growth out of the nursery. The individual steps in this growth . . . the day-to-day operating crises and decisions . . . are trying, at best. But the management of IBM has proven its ability to sustain this substantial growth . . . for itself, and for the entire computer industry.

## NEW REGISTRATIONS

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| COMPUTER INSTALLATIONS CORP. | Computer Installations Corp., 5514 Caroline St., Houston, which leases computers and related equipment, on Sept. 16, filed 280,000 common. The proceeds, at a price to be set by amendment (max. $10) will be used for debt repayment, equipment, and expansion. The underwriter will be Walston and Co., Inc., 74 Wall St., New York. |
| COGNITRONICS CORP. | Cognitronics Corp., 333 Bedford Rd., Mount Kisco, N.Y., a manufacturer of audio response units, specialized computer systems, and magnetic drums, on Aug. 22, filed 100,000 common, of which 50,000 are to be offered by the company and 50,000 by a selling stockholder. The proceeds, at a price to be set by amendment (max. $53.375), will be used for acquisitions and working capital. The underwriter will be Shields and Co., 44 Wall St., New York. |



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| | |
|---|---|
| COMPUTER TRANSCEIVER SYSTEMS, INC. | Computer Transceiver Systems, Inc., 123 Pleasant Valley, Upper Saddle River, N.J., a manufacturer of portable data communications terminals, on Aug. 22, filed 200,000 common. The proceeds, at a price to be set by amendment (max. $10) will be used for equipment, working capital, and other corporate purposes. The underwriter will be Goldwater, Valente, Fitzpatrick & Schall, 5 Hanover Sq., New York. |
| DATA-RAM CORP. | Data-Ram Corp., Route 206, Montgomery Township, N.J., a manufacturer of memory stacks and planes, and memory systems for use in digital computers and related products, on Aug. 21, filed 190,000 common. The proceeds at $7 per share will be used for construction, equipment, and working capital. The underwriter will be R. K. Hickey & Co., 50 Broad St., New York. |
| DATATAB INC. | Datatab, Inc., 315 Park Ave., South, N.Y., which operates data processing centers, on Sept. 12, filed 55,000 warrants to be offered in units of one share and one warrant. The proceeds at a price to be set by amendment (max. $50) will be used by debt repayment, equipment, and working capital. The underwriter will be D. H. Blair Securities Corp., 5 Hanover Sq., New York. |
| DI-AN CONTROLS, INC. | Di-An Controls, Inc., 944 Dorchester Ave., Boston, manufacturers of data processing equipment, on Aug. 26, filed 250,000 common. The proceeds, at a price of $8, will be used for debt repayment and working capital. The underwriter will be Myron A. Lomasney and Co., 67 Broadway, New York. |
| FAIM INFORMATION SERVICES, INC. | Faim Information Services, Inc., 521 5th Ave., N.Y., a company which offers data communications and processing consulting services, on Aug. 26, filed 225,000 common. The proceeds, at $2 per share will be used for expansion, equipment, and working capital. The underwriter will be A.J. Carno Co., Inc., 42 Broadway, New York. |
| MICROMATION TECHNOLOGY CORP. | Micromation Technology Corp., 221 N. LaSalle St., Chicago, a company which offers data processing services and distributes related equipment, on Sept. 4, filed 100,000 common. The proceeds, at a price of $20, will be used for expansion, equipment, and working capital. The underwriter will be Ladenburg, Thalman and Co., 25 Broad St., New York. |
| MODERN DATA TECHNIQUES, INC. | Modern Data Techniques, Inc., 6 Park Ave., Madison, N.J., which markets a computerized billing system, on Sept. 10, filed 100,000 common and 100,000 common purchase warrants to be offered in units of one share and one warrant. The proceeds, at $6 per unit, will be used for expansion, working capital, and other corporate purposes. The underwriter will be Charles Plohn & Co., 200 Park Ave., New York. |
| U.S. TIME SHARING INC. | U.S. Time Sharing Inc., 2135 Wisconsin Ave., N.W., Washington, D.C., a company that offers time-sharing services, on Oct. 18 filed $2.5 million of 6% convertible subordinate debentures, to be offered on a "best efforts, all-or-none" basis. The proceeds, at 100% of principal, will be used for equipment and working capital. Underwriter is Grimm & Davis, Inc., 54 Wall St., New York. |



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| | 1968 High | 1968 Low | 3 week Sales in 100's | 3 week High | 3 week Low | Last | 3 week Net Change | 3 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 2205 | 91 7/8 | 83 1/2 | 85 1/2 | - 5/8 | - 0.73 |
| American R & D | 207 | 122 1/2 | 825 | 171 | 156 1/4 | 158 1/2 | + 2 1/2 | + 1.60 |
| Ampex Corp. | 38 | 26 1/2 | 3713 | 38 | 35 | 37 3/8 | + 2 1/2 | + 7.17 |
| Bunker Ramo | 21 3/8 | 15 3/4 | 8874 | 18 7/8 | 17 | 18 | + 7/8 | + 5.11 |
| Burroughs | 239 5/8 | 157 | 1408 | 238 3/4 | 221 1/2 | 222 3/8 | + 4 3/4 | + 2.09 |
| Collins Radio | 101 1/8 | 53 | 1642 | 66 7/8 | 60 | 61 5/8 | - 2 7/8 | - 4.46 |
| Control Data | 156 | 124 1/4 | 8709 | 145 1/2 | 125 1/4 | 143 3/4 | +15 3/4 | +12.30 |
| Electronic Assoc. | 27 3/8 | 18 | 2630 | 24 3/8 | 21 5/8 | 24 | + 1 7/8 | + 8.47 |
| General Electric | 100 | 80 1/4 | 6933 | 98 | 84 1/2 | 96 5/8 | +11 | +12.85 |
| Honeywell | 139 3/4 | 89 3/8 | 1551 | 130 1/4 | 124 3/4 | 125 1/8 | + 3/8 | + 3.01 |
| IBM | 375 | 313 1/4 | 4913 | 335 | 313 1/4 | 327 | - 5 1/4 | - 1.58 |
| ITT | 61 3/4 | 44 7/8 | 3684 | 61 3/4 | 56 3/8 | 61 5/8 | + 4 1/2 | + 7.88 |
| Litton | 104 3/4 | 62 | 2479 | 83 1/4 | 74 3/4 | 82 7/8 | + 6 1/8 | + 7.98 |
| Memorex | 93 1/2 | 61 1/2 | 1729 | 93 1/2 | 84 1/4 | 89 | + 1 | + 1.14 |
| Nat. Cash Reg. | 154 1/2 | 99 1/2 | 1781 | 139 1/4 | 126 1/8 | 126 1/8 | - 8 5/8 | - 6.40 |
| RCA | 55 | 44 1/4 | 7391 | 52 | 46 5/8 | 47 1/8 | - 2 5/8 | - 5.28 |
| Raytheon | 54 | 33 1/4 | 3337 | 47 5/8 | 44 | 47 1/8 | - 1 7/8 | - 4.14 |
| Sanders | 66 1/2 | 41 3/4 | 2573 | 52 | 47 | 50 1/2 | - 5/8 | - 1.22 |
| Scientific Data | 117 1/2 | 83 5/8 | 3156 | 91 1/2 | 83 3/4 | 83 7/8 | - 4 1/4 | - 4.82 |
| SCM | 61 1/4 | 35 3/4 | 5063 | 43 1/2 | 39 3/8 | 41 7/8 | + 2 1/8 | + 5.35 |
| Singer | 88 7/8 | 62 3/4 | 1750 | 83 3/4 | 76 1/4 | 83 3/8 | - 6 7/8 | - 8.98 |
| Sperry Rand | 63 3/8 | 41 7/8 | 6579 | 46 3/8 | 43 | 44 1/4 | - 2 1/8 | - 4.58 |
| Teledyne | 143 7/8 | 90 1/2 | 2505 | 103 | 98 1/2 | 100 1/2 | - 5/8 | - 0.62 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 0.74 | + 1.35 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 66 1/2 | 42 | 553 | 64 | 54 1/2 | 64 | + 9 1/2 | +17.43 |
| Cal. Comp. | 53 1/4 | 26 3/4 | 1020 | 40 7/8 | 35 | 35 3/8 | + 4 1/2 | +11.29 |
| Clary Corp. | 32 3/8 | 12 1/4 | 695 | 26 7/8 | 24 1/8 | 24 5/8 | + 1/4 | + 1.03 |
| Computer Applications | 42 5/8 | 20 5/8 | 576 | 24 | 21 5/8 | 21 3/4 | + 1 5/8 | + 6.95 |
| Computer Sciences | 64 3/4 | 31 5/8 | 1508 | 57 7/8 | 49 1/4 | 55 3/4 | + 6 1/4 | +12.62 |
| Computing and Software | 73 | 43 1/2 | 473 | 73 | 62 1/2 | 66 | + 4 | + 6.45 |
| Data Proc. Fin. & Gen. | 184 | 85 3/4 | 1261 | 117 7/8 | 105 1/8 | 113 3/4 | + 4 3/8 | + 4.00 |
| Digital Equipment | 160 | 95 1/4 | 630 | 151 | 139 1/2 | 144 1/4 | + 4 3/4 | + 3.41 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 255 | 34 1/2 | 28 1/2 | 31 | + 2 | + 6.90 |
| Granite Computer Leasing | 58 7/8 | 44 | 254 | 52 | 49 1/4 | 50 1/4 | + 1 | + 2.03 |
| Greyhound Computer | 43 1/4 | 27 1/8 | 636 | 33 3/4 | 30 1/4 | 30 1/4 | - 3 1/8 | - 9.43 |
| Leasco | 118 1/4 | 70 3/4 | 2237 | 118 1/4 | 107 3/4 | 112 1/4 | - 3 3/4 | - 3.23 |
| Levin-Townsend Comp. Corp. | 67 3/4 | 47 5/8 | 5430 | 67 3/4 | 57 3/4 | 65 3/4 | + 5 3/4 | + 9.58 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 812 | 37 7/8 | 31 3/4 | 33 7/8 | - 2 1/2 | - 6.87 |
| Mohawk Data Sciences | 107 1/2 | 58 | 10,951 | 79 7/8 | 58 | 68 1/8 | +10 | +12.80 |
| Planning Research | 51 1/4 | 28 | 846 | 51 1/4 | 45 1/8 | 51 | + 5 1/4 | +11.48 |
| Potter Instrument | 38 1/2 | 20 1/2 | 720 | 30 7/8 | 28 | 28 1/8 | - 2 1/8 | - 7.02 |
| Randolph Computers | 64 | 34 5/8 | 713 | 48 7/8 | 45 3/4 | 45 3/4 | - 2 | - 4.19 |
| Systems Eng. Labs. | 42 5/8 | 26 3/8 | 1211 | 31 | 27 1/2 | 29 1/2 | + 1/4 | + 0.85 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 2.34 | + 4.00 |

| | 1968 High Bid | 1968 Low Bid | October 18 Bid | October 18 Asked | 3 weeks ago Bid | 3 week net change Bid | 3 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 34 1/2 | 14 1/2 | 34 1/2 | 36 1/2 | 27 | + 7 1/2 | +27.78 |
| Aries Corp. | 24 | 13 1/2 | 14 | 15 1/2 | 13 1/2 | + 1/2 | + 3.70 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 17 | 18 | 21 1/4 | - 4 1/2 | -21.18 |
| Computer Usage | 62 | 28 1/2 | 33 1/2 | 35 | 31 | + 2 1/2 | + 8.01 |
| Cyber-tronics | 19 | 11 1/2 | 13 3/4 | 14 1/4 | 13 1/2 | + 1/4 | + 1.85 |
| Data Products | 22 | 13 | 17 1/4 | 18 1/8 | 19 | - 1 3/4 | - 9.21 |
| Digitronics | 27 1/2 | 16 1/2 | 19 | 20 | 19 1/2 | - 1/2 | - 2.56 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 14 3/4 | 15 1/4 | 16 1/4 | - 1 1/2 | - 9.23 |
| Electronic Memories | 57 1/2 | 32 3/4 | 47 1/2 | 48 1/2 | 44 1/4 | + 3 1/4 | + 7.34 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 13 1/2 | 14 | 15 | - 1 1/2 | -10.00 |
| Informatics, Inc. | 68 | 32 | 66 | ** | 65 | + 1 | + 1.54 |
| LMC Data, Inc. | 16 | 7 | 9 | 9 3/4 | 8 1/2 | + 1/2 | + 5.82 |
| Management Assistance | 16 1/8 | 9 1/4 | 16 1/8 | 16 1/2 | 10 1/2 | + 5 5/8 | + 5.36 |
| Optical Scanning Corp. | 145 | 81 | 145 | 149 | 107 | +38 | +35.51 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 90 | 91 1/2 | 84 1/2 | + 5 1/2 | + 6.51 |
| Standard Computers | 55 | 30 | 44 1/2 | 46 1/2 | 48 | - 3 1/2 | - 7.29 |
| Tally Corp. | 51 1/2 | 35 | 37 1/2 | 39 1/2 | 39 1/2 | - 2 | - 5.06 |
| TBS Computer Centers Corp. | 21 3/4 | 11 1/4 | 11 3/4 | 12 | 12 | - 1/4 | - 2.08 |
| University Computing | 167 | 57 | 156 | 161 | 163 | - 7 | - 5.15 |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 15,1968 VOL.4,NO.7 P.J.McGOVERN,EDITOR

## GE NAMES EX-HONEYWELL V.P. TO TOP SPOT IN ITS COMPUTER GROUP; MOVE COULD ANSWER QUESTION OF WHETHER TRADITIONAL MANAGEMENT IS ENOUGH

*Q: "Can General Electric treat its computer business as it would any other?"*

*Q: "If it does this, can GE make its computer business successful by applying the traditional management philosophies that have worked in the appliance, the nuclear power plant, and the jet engine business?"*

From virtually the moment that J. Stanford Smith emerged as the top man in General Electric's computer operation, the entire business and computer-watching communities have been asking these questions.

The answer finally seems to have come this week when General Electric announced that it had named Richard M. Bloch as general manager for its advanced development and resources planning division in the Information Systems Group -- GE's computer group. The answer is a "yes . . . but." GE apparently has decided that a careful mixture of corporate professionals with computer professionals will give it the best chance for success in the computer industry.

GE was late to become a competitor in the commercial EDP business, even though it was the first company to purchase a general-purpose digital computer. GE got its start when it won the $60 million ERMA contract with the Bank of America and pioneered MICR (magnetic ink character recognition) equipment, thereby locking the nation's banks into their somewhat outmoded system. This equipment, delivered in 1958, was the first transistorized computer system. GE continued to deliver some equipment, but didn't really play a significant role in the computer industry until the early to middle 1960s.

This is not unusual, for GE isn't known for being the "first" in any business (neither is IBM). Early in the 1960s, GE apparently decided that computers were here to stay, and therefore the giant company decided to support computers just as it had other developments in the past -- refrigerators, nuclear power plants, jet engines. The company decided it was worth plowing very great amounts of money into its computer business, expecting to make this pay over the long haul.

There always has been -- and still is -- skepticism about GE's long-term prospects in the computer industry. Today, there still is talk that the company may attempt to sell out its stake. GE denies this. And the people who know GE well say that from the moment Stan Smith was given the responsibility for GE's computer operation, the only possible conclusion to draw was that GE was in the computer industry for keeps.

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Smith is considered a winner within the company . . . a person close to the top corporate officers . . . probably the best politician in GE's Lexington Ave. headquarters. He has turned at least one other GE business around. And now, his theory about running a computer operation seems to be getting into action. Here is a rundown on how GE is setting up to blend old-line professionalism with computer industry experience.

A new order

Almost a year ago, General Electric announced the first major change in its organizational structure in 16 years -- the number of operating groups was doubled from five to ten, the number of divisions increased from 29 to 46, a President's Office (president, chairman, three executive vice presidents) was created . . . and for the first time computer operations were placed on equal footing with GE's other activities. Stan Smith was given the Information Systems Group.

Following this, there was a lot of confusion as to where what stood. Prior to the reorganization, there had been even more. Now, finally, it has been made clear that the Information Systems Group has an order -- and leadership -- that can simply be described and logically understood. Four divisions report to Smith:

- Information Systems Equipment Division. Now headed by John W. Haanstra, this division handles all engineering, production, and marketing of computers and related devices in the United States. Haanstra joined GE about a year ago after a long career with IBM. There, he headed the Federal Systems Division, was vice president-engineering, and is commonly credited with the development of the first widely sold transistorized or second generation computer -- the 1401.

- International Information Systems Division. This division handles all GE computer interests outside the U.S. -- Information Systems Italia (previously Olivetti-GE), Bull-GE, and interests in the United Kingdom, Canada, Australia, and Japan. Heading this division is Arthur E. Peltosalo, who in the last nine of his 20 years with GE has turned four operating businesses from the red to the black. He hasn't quite yet accomplished that feat in his current assignment, but published French reports show significant reductions in operating losses during each of the past two years. GE shortly expects this division to be in the black.

- Information Services Division. Started in 1965, this division, under the direction of Jerome T. Coe, has pushed GE's time-sharing service business to the largest single factor in this emerging area of new business. Presently, this division is operating slightly in the black with sales of $35 million to $40 million. Coe is another 20-year professional GE manager with several department general manager assignments to his credit.

- Advanced Development and Resources Planning Division. GE's critical point with respect to the future will be decided by this division, which has the responsibility for developing GE's products and business planning worldwide. Richard M. Bloch, just taking over the leadership of this division, will therefore have the responsibility not only of helping determine GE's future in the



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computer industry, but also for guiding GE's development of its next "generation" of computers. This is especially critical, since GE is the only major computer company that really has not introduced a complete family of machines. Bloch is credited with the development of Honeywell's 800 (the first commercially successful parallel processing computer) and its H-200, which with its Liberator concept made significant inroads into IBM's well-established 1401 fortress.

It appears, therefore, that General Electric management -- through Stanford Smith -- clearly seems to have said, at last, that it is giving order to its computer efforts. It has carefully mixed "company" men with "computer" men. The solution may not jell, but it seems to have more chance of this than the admixtures previously available.

Real order?

In its computer operations, therefore, General Electric seems to have made order out of chaos. Finally,

- Primary computer operations are under one roof;
- The present line of equipment is operating successfully, and with GECOS (General Comprehensive Operating Supervisor) on the 600 series machines, GE claims to have "the only operating system now available in industry with which users can perform simultaneously on-line batch processing, remote batch processing, and time sharing using a common data base;"
- Foreign-made computers (witness the 115) have been successfully integrated into the GE line.

This sounds well and good, but it may mean that GE is just now catching up at a time when the computer industry is taking another step forward.

Outside of IBM, the General Electric Company certainly has the best complex of communications equipment offered by industry. But GE has not yet chosen to merge this capability into its computer operations. At present, even the Datanet 30 -- very much a part of every time-sharing system GE sells -- must be bought from a different group within the company . . . bought at retail cost minus marketing expense. Components come a different group, if they come from GE at all.

Thus, GE's outlook within the computer industry is interesting. It will be very difficult for any company to cut significantly into IBM's share of the established computer business. In the growing new area of time sharing, GE currently holds a significant lead, but who's to say where things will stand even one year from now after the "new" Service Bureau Corp. (EDP/IR Oct.30,1968) has had its head?

EDP/IR sees clear evidence that General Electric will remain a factor in the computer industry. The company has the history of supporting "losing" causes for a long-term gain, and there is every reason to believe that GE is committed to computers. This commitment may be in equipment; it is in time sharing; it could be in inter-related communications/computer systems. If, in its involvement with computers, GE believes that progesss is most important, we may well find that this company is one of the most important factors in computers/1970 style.



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## TYPESETTING INSTALLATIONS USING COMPUTERS INCREASE 54% DURING LAST YEAR

The latest survey of computerized typesetting conducted by Composition Information Services shows that the number of installations where computers are used in typesetting has risen to 821, a gain of 54% over the 534 reported in a similar survey last year (EDP/IR Dec. 7,1967). Results of the survey show the trend in computerized typesetting is definitely toward the use of special-purpose machines and toward small general-purpose computers.

Compugraphic Corp. is the leader in supplying computers for typesetting, having sold 136 of its special-purpose JusTape and JusTape Jr.'s to account for nearly half (47.4%) of the new installations during the year covered in the survey. Other popular machines for typesetting are the IBM 1130 and Digital Equipment's PDP-8 and 8/S. Because of the popularity of such small, general-purpose computers, some 51% of the total computerized typesetting systems presently installed are general purpose (see below). If Compugraphic continues to push out its JusTape equipment at the same clip, however, special-purpose machines soon may be ahead.

The CIS study also classified typesetting computer users according to application. The present breakdown is as follows:

64.7% -- newspapers
16.8% -- printers
5.7% -- typesetters
5.6% -- publishers
4.0% -- service centers
2.4% -- governments
0.8% -- educational institutions

In applications at newspapers -- where most of the computerized typesetting systems are located -- Compugraphic holds 53.0% of the market (by installation count), Digital Equipment has 11.9%, and IBM 1130s have 19.2%. Considering all the computers presently installed in this typesetting application, IBM manufacturers some 24% of the computers used.

A growing trend detected in the CIS survey is the use of photocomposition devices in conjunction with computers. Nearly one-third of all computerized typesetting installations have one or more photocomposition devices installed. Mergenthaler and Photon have the two largest penetrations in this market, but the survey lists nine other manufacturers of photocompotition equipment.

Copies of the 12-page Survey of Computerized Typesetting, together with a six-page photocomposition machine supplement, are available. For details, write Composition Information Services, Inc., 1605 N. Cahuenga Blvd., Los Angeles.

COMPUTERS USED IN TYPESETTING, BY MANUFACTURER

| Manufacturer | U.S. & Canada | | International | | Total | |
|---|---|---|---|---|---|---|
| | Installed | On-Order | Installed | On-Order | Installed | On-Order |
| Compugraphic | 304 | 12 | 49 | 2 | 353 | 14 |
| Digital Equipment | 58 | 9 | 21 | 5 | 79 | 14 |
| Fairchild | 14 | 0 | 4 | 1 | 18 | 1 |
| Gutt. GSA/Monotron | 2 | 0 | 31 | 2 | 33 | 2 |
| Honeywell | 19 | 1 | 0 | 0 | 19 | 1 |
| IBM | 178 | 19 | 38 | 6 | 216 | 25 |
| Intertype | 17 | 1 | 5 | 0 | 22 | 1 |
| RCA | 26 | 4 | 0 | 0 | 26 | 4 |
| Others | 18 | 2 | 37 | 10 | 55 | 12 |
| TOTAL | 636 | 48 | 185 | 26 | 821 | 74 |



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## NEW REGISTRATIONS

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| DATATAB INC. (correction) | Datatab, Inc., 315 Park Ave. S., N.Y., which operates data processing centers, on Sept. 12 filed 55,000 units to be offered as 2 common shares and 1 warrant. The proceeds, at a price to be set by amendment (max. $50) will be used for debt repayment, equipment, and working capital. The underwriter will be D. H. Blair Securities Corp., 437 Madison Ave., New York. |
| GRAHAM MAGNETICS INC. | Graham Magnetics Inc., Graham, Tex., a manufacturer of high quality magnetic tapes, on Oct. 29 filed 200,000 common. The proceeds, at a price of $20, will be used for expansion, product development, and working capital. The underwriter will be Kleiner, Bell & Co., 9756 Wilshire Blvd., Beverly Hills, Calif. |
| INTERNATIONAL COMPUTER CORP. | International Computer Corp., 99 Park Ave., New York, which will engage in the leasing of computers and the operation of computer schools, filed 150,000 shares of common on Oct. 29. The proceeds, at a price to be set by amendment (max. $15), will be used for equipment, acquisitions, and working capital. The underwriters have not yet been named. |
| INTERNATIONAL SYSTEMS ASSOCIATES, LTD. | International Systems Associates, Ltd., 350 Fifth Ave., New York, a computer software company, on Oct. 25 filed 300,000 common, of which 30,000 are being offered by a selling stockholder. The proceeds, at a price to be set by amendment (max. $6), will be used for expansion and program development. The underwriter will be D. H. Blair, 66 Beaver St., New York. |
| MANAGEMENT INFORMATION SYSTEMS, INC. | Management Information Systems, Inc., 759 State Rd., Princeton, N.J., a computer software service company, on Oct. 29 filed some 140,000 common. The proceeds, at a price to be set by amendment (max. $6.25), will be used for debt retirement, equipment, program development, working capital, and other corporate purposes. Underwriter will be Goldwater, Valente, Fitzpatrick, & Schall, 5 Hanover Square, New York. |
| MECCA COMPUTER SYSTEMS, INC. | Mecca Computer Systems, Inc., 1200 Simms Bldg., Albuquerque, N.M., which leases computers and operates service bureaus, on Oct. 24 filed 600,000 common to be offered on a "best efforts basis." The proceeds, at a price of $2 per share, will be used for equipment and working capital. The underwriter will be Shoemaker and Co., Inc., 110 Park Ave., Oklahoma City, Okla. |
| WORLDWIDE COMPUTER SERVICES, INC. | Worldwide Computer Services, Inc., 225 Westchester Ave., Port Chester, N.Y., a software development company, on Oct. 28 filed 100,000 shares of common. The proceeds, at a price to be set by amendment (max. $5) will be used for the acquisition of additional staff and of additional office space, and for sales promotion. The underwriter will be Kern Securities Corp., 111 Broadway, New York. |



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF SEPTEMBER 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $4600 | 1/54 | 24 | 3 | 27 | X |
| | 220 | $14,000 | 10/58 | 27 | 2 | 29 | X |
| | B100 | $2800 | 8/64 | 172 | 28 | 200 | 2 |
| | B200 Series | $5400 | 11/61 | 462 | 84 | 546 | 10 |
| | B300 Series | $9000 | 7/65 | 420 | 90 | 510 | 90 |
| | B500 | $3800 | 10/68 | 0 | 0 | 0 | 105 |
| | B2500 | $5000 | 2/67 | 64 | 11 | 75 | 125 |
| | B3500 | $14,000 | 5/67 | 76 | 14 | 90 | 235 |
| | B5500 | $25,000 | 3/63 | 78 | 8 | 86 | 3 |
| | B6500 | $33,000 | 6/69 | 0 | 0 | 0 | 42 |
| | B7500 | $44,000 | 9/69 | 0 | 0 | 0 | 18 |
| | B8500 | $200,000 | 12/68 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $1600 | 7/55 | 274 | 12 | 286 | X |
| | G-20 | $15,500 | 4/61 | 18 | 2 | 20 | X |
| | LGP-21 | $725 | 12/62 | 149 | 3 | 152 | X |
| | LGP-30 | $1300 | 9/56 | 108 | 5 | 113 | X |
| | RPC-4000 | $1875 | 1/61 | 49 | 4 | 53 | X |
| | 160*/160A/160C | $2100/$5000/$12,000 | 5/60;7/61;3/64 | 466 | 39 | 505 | X |
| | 924/924A | $11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $45,000 | 1/60 | 48 | 3 | 51 | X |
| | 1700 | $3800 | 5/66 | 122 | 48 | 170 | 120 |
| | 3100/3150 | $10,000 | 12/64 | 102 | 23 | 125 | 26 |
| | 3200 | $14,000 | 5/64 | 46 | 16 | 62 | X |
| | 3300 | $20,000 | 9/65 | 104 | 26 | 130 | 28 |
| | 3400 | $18,000 | 11/64 | 15 | 4 | 19 | X |
| | 3500 | $25,000 | 8/68 | 1 | 0 | 1 | 26 |
| | 3600 | $52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $53,000 | 2/66 | 19 | 3 | 22 | 2 |
| | 6400/6500 | $56,000 | 5/66 | 42 | 14 | 56 | 28 |
| | 6600 | $115,000 | 8/64 | 40 | 11 | 51 | 16 |
| | 7600 | $150,000 | 11/68 | 0 | 0 | 0 | 2 |
| Digital Equipment Corp. | PDP-1 | $3400 | 11/60 | 56 | 3 | 59 | X |
| | PDP-4 | $1700 | 8/62 | 49 | 5 | 54 | X |
| | PDP-5 | $900 | 9/63 | 97 | 11 | 108 | X |
| | PDP-6 | $10,000 | 10/64 | 14 | 5 | 19 | X |
| | PDP-7 | $1300 | 11/64 | 142 | 41 | 183 | 3 |
| | PDP-8 | $525 | 4/65 | 1690 | 460 | 2150 | 50 |
| | PDP-9 | $1100 | 12/66 | 174 | 46 | 220 | 34 |
| | PDP-10 | $9000 | 10/67 | 20 | 4 | 24 | 25 |
| Electronic Associates | 640 | $1200 | 9/67 | 32 | 18 | 50 | 22 |
| | 8400 | $12,000 | 6/65 | 19 | 6 | 25 | 3 |
| EMR Computer Division | ASI 210 | $3850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $4200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $4400 | 4/65 | 16 | 0 | 16 | 2 |
| | ADVANCE 6040 | $5600 | 7/65 | 6 | 3 | 9 | 4 |
| | ADVANCE 6050 | $9000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $1550 | 10/67 | 18 | 3 | 21 | 14 |
| General Electric | 115 | $2200 | 12/65 | 355 | 465 | 820 | 400 |
| | 130 | $4500 | 3/69 | 0 | 0 | 0 | 120 |
| | 205 | $2900 | 6/64 | 14 | 0 | 14 | X |
| | 210 | $16,000 | 7/59 | 36 | 0 | 36 | X |
| | 215 | $6000 | 9/63 | 20 | 3 | 23 | X |
| | 225 | $8300 | 4/61 | 145 | 20 | 165 | X |
| | 235 | $12,500 | 4/64 | 111 | 23 | 134 | 18 |
| | 405 | $6000 | 2/68 | 25 | 5 | 30 | 50 |
| | 415 | $11,000 | 5/64 | 324 | 106 | 430 | 45 |
| | 425 | $18,000 | 6/64 | 114 | 33 | 147 | 35 |
| | 435 | $25,000 | 9/65 | 31 | 9 | 40 | 15 |
| | 625 | $50,000 | 4/65 | 34 | 6 | 40 | 10 |
| | 635 | $60,000 | 5/65 | 44 | 6 | 50 | 20 |
| | 645 | $90,000 | 7/66 | 7 | 0 | 7 | 2 |
| | GE-PAC 4020 | $5000 | 2/67 | 44 | 16 | 60 | 90 |
| | GE-PAC 4040 | $3000 | 8/64 | 43 | 14 | 57 | 9 |
| | GE-PAC 4050 | $7000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $8500 | 6/65 | 16 | 2 | 18 | 2 |
| Hewlett-Packard | 2000A | $2500 | 2/69 | 0 | 0 | 0 | 60 |



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|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $2500 | 5/63 | 75 | 2 | 77 | X |
| | DDP-116 | $900 | 4/65 | 196 | 39 | 235 | 15 |
| | DDP-124 | $2050 | 3/66 | 54 | 17 | 71 | 18 |
| | DDP-224 | $3300 | 3/65 | 48 | 10 | 58 | 2 |
| | DDP-516 | $700 | 9/66 | 121 | 45 | 166 | 132 |
| | H-110 | $2500 | 9/68 | 0 | 0 | 0 | 105 |
| | H-120 | $4000 | 1/66 | 735 | 165 | 900 | 120 |
| | H-125 | $5000 | 12/67 | 42 | 6 | 48 | 80 |
| | H-200 | $8600 | 3/64 | 810 | 340 | 1150 | 110 |
| | H-400 | $8500 | 12/61 | 53 | 37 | 90 | X |
| | H-632 | $3500 | 11/68 | 0 | 0 | 0 | 35 |
| | H-800 | $28,000 | 12/60 | 60 | 14 | 74 | X |
| | H-1200 | $10,000 | 2/66 | 197 | 48 | 245 | 90 |
| | H-1250 | $12,000 | 8/68 | 1 | 0 | 1 | 44 |
| | H-1400 | $14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $16,000 | 1/66 | 105 | 20 | 125 | 70 |
| | H-4200 | $20,500 | 9/68 | 0 | 0 | 0 | 25 |
| | H-8200 | $50,000 | 12/68 | 0 | 0 | 0 | 10 |
| IBM | 305 | $3600 | 12/57 | 66 | 25 | 91 | X |
| | 360/20 | $2800 | 12/65 | 5150 | 3600 | 8750 | 3200 |
| | 360/25 | $5330 | 1/69 | 0 | 0 | 0 | 2300 |
| | 360/30 | $9300 | 5/65 | 5000 | 3500 | 8500 | 1150 |
| | 360/40 | $19,500 | 4/65 | 2740 | 1020 | 3760 | 600 |
| | 360/44 | $15,000 | 7/66 | 283 | 81 | 364 | 80 |
| | 360/50 | $33,000 | 8/65 | 960 | 250 | 1210 | 800 |
| | 360/65 | $70,000 | 11/65 | 494 | 96 | 590 | 310 |
| | 360/67 | $138,000 | 6/66 | 37 | 9 | 46 | 30 |
| | 360/75 | $81,400 | 1/66 | 33 | 8 | 41 | 15 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 22 |
| | 360/90 Series | $150,000 | 11/67 | 5 | 0 | 5 | 14 |
| | 650 | $4800 | 11/54 | 92 | 28 | 120 | X |
| | 1130 | $1700 | 2/66 | 3150 | 1250 | 4400 | 3400 |
| | 1401 | $6200 | 9/60 | 3680 | 2120 | 5800 | X |
| | 1401-G | $2300 | 5/64 | 690 | 650 | 1340 | X |
| | 1401-H | $1300 | 6/67 | 290 | 190 | 480 | 110 |
| | 1410 | $17,000 | 11/61 | 370 | 200 | 570 | X |
| | 1440 | $4100 | 4/63 | 1850 | 1300 | 3150 | 40 |
| | 1460 | $9800 | 10/63 | 755 | 145 | 900 | X |
| | 1620 I, II | $4000 | 9/60 | 930 | 500 | 1430 | X |
| | 1800 | $5100 | 1/66 | 420 | 150 | 570 | 310 |
| | 7010 | $26,000 | 10/63 | 145 | 25 | 170 | X |
| | 702 | $6900 | 2/55 | 4 | 0 | 4 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $32,000 | 12/55 | 19 | 2 | 21 | X |
| | 7040 | $25,000 | 6/63 | 60 | 44 | 104 | X |
| | 7044 | $36,500 | 6/63 | 89 | 32 | 121 | X |
| | 705 | $38,000 | 11/55 | 29 | 5 | 34 | X |
| | 7070, 2, 4 | $27,000 | 3/60 | 162 | 88 | 250 | X |
| | 7080 | $60,000 | 8/61 | 78 | 3 | 81 | X |
| | 709 | $40,000 | 8/58 | 3 | 0 | 3 | X |
| | 7090 | $63,500 | 11/59 | 30 | 6 | 36 | X |
| | 7094 | $75,500 | 9/62 | 97 | 3 | 100 | X |
| | 7094 II | $82,500 | 4/64 | 113 | 9 | 122 | X |
| National Cash Register | NCR-304 | $14,000 | 1/60 | 21 | 2 | 23 | X |
| | NCR-310 | $2500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $8700 | 5/62 | 490 | 260 | 750 | 35 |
| | NCR-315-RMC | $12,000 | 9/65 | 87 | 20 | 107 | 25 |
| | NCR-390 | $1850 | 5/61 | 300 | 250 | 550 | X |
| | NCR-500 | $1500 | 10/65 | 1650 | 950 | 2600 | 500 |
| | Century 100 | $2645 | 9/68 | 2 | 0 | 2 | 530 |
| | Century 200 | $7500 | 2/69 | 0 | 0 | 0 | 420 |
| Philco | 1000 | $7010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $40,000 | 10/58 | 13 | 1 | 14 | X |
| | 2000-212 | $52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $7000 | 2/61 | 402 | 207 | 609 | X |
| | RCA 3301 | $18,000 | 7/64 | 75 | 10 | 85 | X |
| | RCA 501 | $14,000 | 6/59 | 79 | 2 | 81 | X |
| | RCA 601 | $35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $4100 | 9/65 | 147 | 63 | 210 | 70 |
| | Spectra 70/25 | $6700 | 9/65 | 91 | 34 | 125 | 45 |
| | Spectra 70/35 | $8000 | 1/67 | 118 | 52 | 170 | 136 |
| | Spectra 70/45 | $23,000 | 11/65 | 195 | 58 | 253 | 76 |
| | Spectra 70/46 | $33,400 | 10/68 | 0 | 0 | 0 | 5 |
| | Spectra 70/55 | $33,300 | 11/66 | 13 | 2 | 15 | 16 |
| Raytheon | 250 | $1200 | 12/60 | 124 | 49 | 173 | X |
| | 440 | $3500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $3200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp | 650 | $500 | 5/66 | 25 | 0 | 25 | 0 |
| | 655 | $1800 | 10/66 | 63 | 0 | 63 | 25 |
| | 660 | $2000 | 10/65 | 9 | 0 | 9 | 5 |
| | 670 | $2600 | 5/66 | 1 | 0 | 1 | 0 |
| | 4700 | $800 | 2/69 | 0 | 0 | 0 | 2 |
| | 6700 | $30,000 | 10/68 | 0 | 0 | 0 | 1 |
| Scientific Data Systems | SDS-92 | $1500 | 4/65 | 127 | 6 | 133 | 2 |
| | SDS-910 | $2000 | 8/62 | 209 | 15 | 224 | 4 |
| | SDS-920 | $2900 | 9/62 | 184 | 8 | 192 | 4 |
| | SDS-925 | $3000 | 12/64 | 57 | 2 | 59 | 4 |
| | SDS-930 | $3400 | 6/64 | 221 | 25 | 246 | 8 |
| | SDS-940 | $18,000 | 4/66 | 31 | 0 | 31 | 20 |
| | SDS-9300 | $8500 | 11/64 | 33 | 2 | 35 | 2 |
| | Sigma 2 | $1800 | 12/66 | 108 | 12 | 120 | 175 |
| | Sigma 5 | $6500 | 8/67 | 30 | 10 | 40 | 60 |
| | Sigma 7 | $12,000 | 12/66 | 31 | 9 | 40 | 20 |
| Standard Computer Corp | IC6000 | $18,000 | 5/67 | 12 | 0 | 12 | 12 |
| | IC4000 | $10,000 | 9/68 | 0 | 0 | 0 | 2 |
| Systems Eng Labs | 810 | $1000 | 9/65 | 22 | 2 | 24 | X |
| | 810A | $900 | 8/66 | 85 | 10 | 95 | 28 |
| | 840 | $1400 | 11/65 | 4 | 0 | 4 | X |
| | 840A | $1400 | 8/66 | 63 | 2 | 65 | 15 |
| UNIVAC | I & II | $25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $21,000 | 8/62 | 76 | 13 | 89 | X |
| | File Computers | $15,000 | 8/56 | 10 | 0 | 10 | X |
| | SS 80, 90 & Step | $8000 | 8/58 | 108 | 74 | 182 | X |
| | 418 | $11,000 | 6/63 | 102 | 52 | 154 | 20 |
| | 490 Series | $30,000 | 12/61 | 194 | 30 | 224 | 34 |
| | 1004 | $1900 | 2/63 | 1850 | 1040 | 2890 | 10 |
| | 1005 | $2400 | 4/66 | 865 | 385 | 1250 | 80 |
| | 1050 | $8500 | 9/63 | 189 | 86 | 275 | 5 |
| | 1101-1105 | $35,000 | 12/50 | 7 | 0 | 7 | X |
| | 1107 | $57,000 | 10/62 | 20 | 8 | 28 | X |
| | 1108 | $68,000 | 9/65 | 95 | 35 | 130 | 93 |
| | 9200 | $1500 | 6/67 | 250 | 60 | 310 | 670 |
| | 9300 | $3400 | 9/67 | 120 | 40 | 160 | 530 |
| | 9400 | $7000 | 5/69 | 0 | 0 | 0 | 115 |
| | LARC | $135,000 | 5/60 | 2 | 0 | 2 | X |
| | | | TOTALS | 46,194 | 21,767 | 67,961 | 17,061 |

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.



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October 21 - November 1, 1968

| NEW YORK STOCK EXCHANGE | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| Addressograph-Multigraph | 91 7/8 | 52 | 928 | 85 7/8 | 78 1/2 | 79 1/4 | - 6 1/4 | - 7.31 |
| American R & D | 207 | 122 1/2 | 217 | 161 1/4 | 155 1/2 | 155 1/2 | - 3 | - 1.89 |
| Ampex Corp. | 38 | 26 1/2 | 2759 | 37 1/2 | 33 3/4 | 35 1/2 | - 1 7/8 | - 5.02 |
| Bunker Ramo | 21 3/8 | 15 1/2 | 5582 | 18 1/4 | 15 1/2 | 15 1/2 | - 2 1/2 | -13.88 |
| Burroughs | 239 5/8 | 157 | 1184 | 226 3/4 | 215 1/8 | 226 | + 3 5/8 | + 1.63 |
| Collins Radio | 101 1/8 | 53 | 538 | 63 1/2 | 59 1/8 | 59 1/2 | - 2 1/8 | - 3.46 |
| Control Data | 156 | 124 1/4 | 3771 | 143 7/8 | 136 5/8 | 137 1/8 | - 6 5/8 | - 4.61 |
| Electronic Assoc. | 27 3/8 | 18 | 903 | 24 | 22 | 22 7/8 | - 1 1/8 | - 4.69 |
| General Electric | 100 | 80 1/4 | 4073 | 98 | 93 | 94 1/8 | - 2 1/2 | - 2.59 |
| Honeywell | 139 3/4 | 89 3/8 | 1349 | 125 1/4 | 114 1/2 | 115 1/4 | - 9 3/4 | - 7.79 |
| IBM | 375 | 304 1/2 | 4573 | 329 1/2 | 304 1/2 | 309 | -18 | - 5.50 |
| ITT | 62 | 44 7/8 | 2032 | 62 | 57 1/4 | 58 3/8 | - 3 1/4 | - 5.27 |
| Litton | 104 3/4 | 62 | 2330 | 82 5/8 | 72 1/4 | 79 3/8 | - 3 1/2 | - 4.22 |
| Memorex | 93 1/2 | 61 1/2 | 1819 | 89 1/2 | 73 1/4 | 74 1/4 | -14 3/4 | -16.57 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 1717 | 127 3/4 | 116 1/4 | 117 1/2 | - 8 5/8 | - 6.84 |
| RCA | 55 | 44 1/4 | 3347 | 48 1/2 | 45 3/4 | 46 1/2 | - 5/8 | - 1.33 |
| Raytheon | 54 | 33 1/4 | 1336 | 47 3/8 | 42 3/8 | 43 1/4 | - 3 7/8 | - 8.22 |
| Sanders | 66 1/2 | 41 3/4 | 1202 | 50 3/4 | 48 3/4 | 49 1/2 | - 1 | - 1.98 |
| Scientific Data | 117 1/2 | 79 3/4 | 1981 | 84 | 79 3/4 | 81 3/4 | - 2 1/8 | - 2.53 |
| SCM | 61 1/4 | 35 3/4 | 1819 | 42 1/8 | 38 3/4 | 39 | - 2 7/8 | - 6.86 |
| Singer | 88 7/8 | 62 3/4 | 1279 | 84 7/8 | 82 1/8 | 84 3/8 | + 1 | + 1.20 |
| Sperry Rand | 63 3/8 | 41 3/8 | 4927 | 44 3/8 | 41 3/8 | 42 | - 2 1/4 | - 5.08 |
| Teledyne | 143 7/8 | 90 1/8 | 1828 | 100 1/4 | 92 1/2 | 92 1/2 | - 8 | - 7.96 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 4.35 | - 5.23 |

| AMERICAN STOCK EXCHANGE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Automatic D P | 66 1/4 | 42 | 248 | 65 | 60 3/8 | 60 3/8 | - 3 5/8 | - 5.66 |
| Cal. Comp. | 53 1/4 | 26 3/4 | 621 | 36 3/8 | 33 3/4 | 33 7/8 | - 1 3/4 | - 5.65 |
| Clary Corp. | 32 3/8 | 12 1/4 | 1038 | 24 1/2 | 18 7/8 | 19 3/4 | - 4 7/8 | -19.80 |
| Computer Applications | 42 5/8 | 20 3/8 | 412 | 21 7/8 | 20 3/8 | 20 1/2 | - 1 1/4 | - 5.74 |
| Computer Sciences | 64 3/4 | 31 5/8 | 947 | 59 | 53 1/4 | 53 1/4 | - 2 1/2 | - 4.48 |
| Computing and Software | 73 1/2 | 43 1/2 | 335 | 73 1/2 | 66 | 72 | + 6 | + 9.09 |
| Data Proc. Fin. & Gen. | 184 | 85 3/4 | 779 | 114 3/8 | 92 1/8 | 92 1/8 | -21 5/8 | -19.01 |
| Digital Equipment | 160 | 95 1/4 | 576 | 144 | 133 | 140 3/8 | - 3 7/8 | - 2.69 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 122 | 32 1/8 | 28 5/8 | 30 1/2 | - 1/2 | - 1.61 |
| Granite Computer Leasing | 58 7/8 | 43 3/4 | 472 | 50 3/8 | 43 3/4 | 44 1/2 | - 5 3/4 | -11.44 |
| Greyhound Computer | 43 1/4 | 25 1/8 | 706 | 30 3/8 | 25 1/8 | 25 3/8 | - 4 7/8 | -16.12 |
| Leasco | 118 1/4 | 70 3/4 | 1221 | 115 1/2 | 102 3/8 | 103 7/8 | - 8 3/8 | - 7.46 |
| Levin-Townsend Comp. Corp. | 67 3/4 | 47 5/8 | 3767 | 66 | 52 1/2 | 53 1/4 | -12 1/2 | -19.01 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 736 | 33 5/8 | 23 1/2 | 24 | - 9 7/8 | -29.15 |
| Mohawk Data Sciences | 107 1/2 | 58 | 2612 | 69 3/8 | 59 7/8 | 62 1/4 | - 5 7/8 | - 8.62 |
| Planning Research | 55 1/8 | 28 | 923 | 55 1/8 | 50 3/4 | 54 | + 3 | + 5.88 |
| Potter Instrument | 38 1/2 | 20 1/2 | 1046 | 30 3/4 | 28 1/2 | 29 | + 7/8 | + 3.11 |
| Randolph Computers | 64 | 34 5/8 | 1018 | 46 1/4 | 39 | 39 | - 6 3/4 | -14.75 |
| Systems Eng. Labs. | 42 5/8 | 26 3/4 | 583 | 29 5/8 | 27 1/4 | 27 1/4 | - 2 1/4 | - 7.63 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 5.18 | - 8.38 |

| OVER-THE-COUNTER | 1968 High Bid | 1968 Low Bid | November 1 Bid | November 1 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 34 1/2 | 14 1/2 | 33 | 35 | 34 1/2 | - 1 1/2 | - 4.35 |
| Aries Corp. | 24 | 13 1/2 | 13 3/4 | 14 1/4 | 14 | - 1/4 | - 1.77 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 14 3/4 | 15 1/4 | 17 | - 2 1/4 | -13.24 |
| Computer Usage | 62 | 28 1/2 | 31 1/2 | 33 | 33 1/2 | - 2 | - 5.97 |
| Cyber-tronics | 19 | 11 1/2 | 11 1/2 | 12 1/4 | 13 3/4 | - 2 1/4 | -16.36 |
| Data Products | 22 | 13 | 16 1/2 | 17 | 17 1/4 | - 3/4 | - 4.35 |
| Digitronics | 27 1/2 | 16 1/2 | 17 3/4 | 18 3/4 | 19 | - 1 1/4 | - 6.57 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 14 1/8 | 14 7/8 | 14 3/4 | - 5/8 | - 4.24 |
| Electronic Memories | 57 1/2 | 32 3/4 | 48 | 49 | 47 1/2 | + 1/2 | + 1.05 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 13 | 13 1/4 | 13 1/2 | - 1/2 | - 3.70 |
| Informatics, Inc. | 68 | 32 | 63 | ** | 66 | - 3 | - 4.53 |
| LMC Data, Inc. | 16 | 7 | 8 | 8 3/4 | 9 | - 1 | -11.11 |
| Management Assistance | 16 3/4 | 9 1/4 | 13 3/8 | 13 3/4 | 16 1/8 | - 2 3/4 | -17.05 |
| Optical Scanning Corp. | 145 | 71 | 128 | 132 | 145 | -17 | -11.72 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 82 | 84 | 90 | - 8 | - 8.89 |
| Standard Computers | 55 | 30 | 41 1/2 | 43 | 44 1/2 | - 3 | - 6.74 |
| Tally Corp. | 51 1/2 | 35 | 35 | 36 1/2 | 37 1/2 | - 2 1/2 | - 6.67 |
| TBS Computer Centers Corp. | 21 3/4 | 11 1/4 | 12 1/4 | 13 | 11 3/4 | + 1/2 | + 4.25 |
| University Computing | 167 | 57 | 151 | 156 | 156 | - 5 | - 3.21 |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 5,1968 ● VOL.4,NO.8 P.J.McGOVERN,EDITOR

## CDC UNVEILS THE LONG-AWAITED 7600 SUPERCOMPUTER THAT DEFINES COMPANY'S FUTURE AND PERHAPS INDUSTRY'S COMPLEXION

Just over five years ago, a small-but-optimistic Control Data Corporation brought members of the national press out to Minneapolis, shuttled them over to an almost secret development laboratory in Chippewa Falls, Wis., and showed off the 6600 computer and its inventor -- Seymour R. Cray. This machine was described, then, as the world's most powerful operational computer . . . it still is.

Early this December, the scene was virtually repeated. Seymour Cray and Chippewa Falls hadn't changed too much; because of the season, there were several inches of snow on the lake-country ground; the big attraction this time around was a computer called the 7600 -- talked about for several years. As the big brother to the 6600, this new computer will assume the title of "biggest, best, and fastest" when it is installed at Lawrence Radiation Laboratory's Livermore, Calif., facility in January.

The 7600 is quite a computer.

It looks like no computer ever built, yet is almost the direct descendant of a computer designed by many of the same people who were the leaders of Engineering Research Associates Inc., in the early 1950s and who eventually founded CDC. ERA was one of the two early computer companies started just after World War II and eventually bought by the then Remington-Rand Corp. Behind the 7600 is the thinking and the planning of a small group of computer pioneers. This machine, moreover, represents the future of Control Data. From the continued development of 7600 computer systems will come most of CDC's computer system announcements for at least the rest of this decade and the first few years of the next.

Embodied in the 7600 are some of today's most advanced computing system ideas -- and some of the earliest:

- The machine reflects CDC's commitment to large computers serving as the nucleus of a distributed network; its organization, however, illustrates a trend toward building into hardware some of the capabilities that have previously made large-scale system software so difficult to develop.

- The 7600 has memory and speed specifications which qualify it to be called the largest and fastest; interestingly, the computer contains no "way out" electronics such as integrated circuitry or large-scale integration.

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- Highly compatible with the 6000 series machines, the 7600 is another evolutionary step forward; it forms the basis for a whole family itself, however, and other 7000 series machines as well as an entire new line of multi-processing computers can be expected.

With the introduction of the 7600, CDC has done several things. It has confirmed its belief that supercomputers and associated computing networks are important for the future; its has produced, essentially, the fourth in a series of computers that can be traced directly back to the 1101 and 1103 built by ERA in the early 1950s and continues through Control Data's 1604 and 6600; it has verified that, even in today's complex state of technology, a few brilliant and dedicated people are more important than thousands of sub-groups and operating committees. In the remainder of this report, we will explain what the 7600 is and what its effect may be on the computer industry in general and on CDC in particular.

## A glass and walnut box

The 7600 is contained in a one-foot wide, six-foot high cabinet that is built in the shape of a square, ten feet on each side. The cabinet is made of blue glass and trimmed with stainless steel and simulated walnut panels. As Cray puts it: "We've built a 10 by 10-foot box with a 9 by 9-foot walnut panelled office inside for the customer engineer." There is an opening on one side.

In this box there is a powerful assemblage of electronic components connected by 175,000 feet of twisted wire. Among the components are 1.8 million transistors, 2.2 million resistors, and 37 million magnetic cores. These elements are organized into a computer that has nine independent arithmetic units that can perform 15 million to 18 million instructions per second, and two memories -- a "small" core memory of 65,536 60-bit words, and a "large" core memory of 512,000 words of the same size. The transfer rate is 27.5 nanoseconds (billionths of a second) per word, maximum.

And all of this is done with discrete components. What about integrated circuits and large-scale integration? CDC says that even today these aren't as fast or as reliable as discrete components. Cray says the situation is simple: "If you want to build the fastest computer possible, you probably need to use tweezers and microscopes, which we have done." Looking out toward his next assignment, that of building the successor to the 7600, Cray says that he is investigating all the new techniques. Memory, for example, may take advantage of semiconductors or thin films. But as far as the central processor is concerned, Cray says, "I think we'll have to put a more powerful lens in our microscope and get smaller tweezers."

The small components are assembled in very compact circuit and memory modules that look like oversized dominoes about two by four inches on the face and some two inches deep. The face of the dominoes show on the outside of the 7600's cabinet, and the wires which interconnect the leads make colorful streams on the inside of the "box." These modules offer the great promise -- and perhaps the big problem -- for CDC's latest supercomputer. There is a question as to how readily they can be mass produced. A whole collection of smaller "computers" can be made with them.

## Outside the "inner circle"

The glass and walnut box described above -- the 7600's central processing unit and memory -- is designed, virtually, to be seen but not touched. Of course



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there is a console (from the 6000 line) and a card reader for maintenance purposes, but by design there are no input/output devices connected directly to the CPU. The 7600 system is designed as a network involving a hierarchy of computers. All input and output from the central configuration must go through another processor.

Primarily, this other processor will be one or more of what CDC calls the peripheral processing unit. This building block element -- manufactured from modules used in the 7600 -- has 4,096 12-bit words of memory, an internal logic speed of 27.5 nanoseconds, and eight independent input/output channels. One of these will be hooked to each of the fifteen channels of the 7600 CPU to form the "inner circle," or "ring" of the system.

Connected to each of these "ports" on the 7600 will be what CDC calls its six-processor peripheral station. Each of these is actually composed of six of the PPUs and operates in a multiprocessing mode. One of the PPUs, for example, might operate a bank of tape drives, another a high-speed printer, and a two- or three-unit group might be multiprocessing to supply time-sharing service to a network of remote terminals. There is no plan, at present, to sell these PPU stations independently, but CDC spokesmen say that a six-processor station would sell in the neighborhood of $275,000 -- about the price tag on IBM's 360/25.

With this "Christmas tree" organization of the 7600, the CPU is freed from bothering with input/output control, and at the same time the PPUs operate almost as independent satellite computers, giving problems to the CPU, receiving answers, and providing these answers to the user in the format desired. Because of this arrangement, software requirements are for smaller scale systems and no overall operating system is required to keep complete control of every element in the complete system.

## High degree of compatibility

Over all, the organization of the 7600 is not too different from that of the 6600. The older computer has the nine independent arithmetic units, and handles its input/output through ten peripheral processors. These units, however, are built into the mainframe of the computer and don't offer the flexibility and expandability that the 7600 does.

The CPU of the 7600 has exactly the same instruction set as does the 6600, so software written for the 6600 is supposed to work, untouched, on the 7600. There will need to be new software to handle the input/output portions of the 7600, and operating systems will have to be constructed for peripheral processors to take advantage of their multiprocessing capability. But the scope of the problem is considered minimal when compared to that faced after the introduction of the 6600.

At least the first two 7600s -- probably the only deliveries that can be counted on for 1969 -- will go to Livermore. And this customer insists on writing his own software from the ground up. It will be, therefore, sometime in 1970 or 1971 before CDC will have to deliver software to a 7600 customer. CDC says it will be ready by this time, and most industry observers tend to agree.

## A look into the 1970s

It is fairly certain that Control Data won't have the troubles it had with the 6600, if for no other reason than the fact that it had the troubles. Today, also, CDC's support facilities are improved, and much of the software work and



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experience from the 6000 efforts can be carried over. Recalling its experiences with the 6600, CDC has established a "War Room" which is responsible for monitoring the overall 7600 schedules and production. Paul Miller, vice president and group general manager, likens the complexity in developing the 7600 to that of a large aircraft or missile system. He says: "We did not have a War Room for the 6600, just as Boeing didn't for the 707, but from our viewpoint the corporate commitment to the 7600 program is perhaps comparable to Boeing's commitment to the 747."

William C. Norris, CDC president and chairman, emphasized this commitment at the 7600's official introduction. He described the 7600 program as "the largest and most difficult ever undertaken by Control Data" and "a milestone in our history. It will extend, for many years, CDC's leadership in making the world's most powerful computers. Our major business strategy -- simply stated -- is big computers."

A new generation?

This new computer system talked about by Control Data presents a real quandary to the computer buff who would assign it to a particular "generation." When asked directly "Is this a 'fourth' generation computer?" CDC representatives hurriedly say "NO!" EDP/IR is pleased with this frankness, and takes this opportunity to comment, again, on the generation concept.

We have never felt that the type of electronic component used in a system was any measure of its "generation" status; rather, we look at successive generations as significant steps forward in computer organization, and have said that all the computers now being produced were probably "third generation" -- price/performance competitive in today's marketplace -- systems. We have described the computer system to be offered by NCR as a transition generation system.

The 7600 throws another wrench into the works, and in effect eliminates even further the use of the term "generation." By accepted standards used in the popular press, the 7600 is a second generation computer; within our concept of what the term generation should mean, this computer comes close to being a true "fourth generation" machine. By this terminology, we mean a computer system that is highly modular in construction -- one that can be supplied to any customer in a configuration that fits his needs -- and that, because of modularity, is composed of mass-produced elements even in limited numbers. The 7600 isn't quite this machine, but it approaches the definition. We will call it the latest in a design concept predicated on supplying the most computing power available with current technology.

Prognosis

Control Data is commited to the 7600, and as such has gambled -- with strong cards -- on the concept of the powerful supercomputer surrounded by a hierarchy of subservient computers, each performing its required function. Six of the 7600s -- priced at $9 million to $15 million each -- are already ordered, only one of which will be leased. Chippewa Falls expects to built a dozen while production facilities are being readied in Minneapolis, and CDC expects to deliver "several production machines within two years." Chairman Norris' expectation of delivering "definitely over 100" would seem within reach, since over 100 6000 computers have already been delivered, orders are at an all-time high, and CDC thinks that the availability of the 7600 will increase orders of the 6000 line for use as predecessors. Even now, most of the customers of CDC's 6000 series machines are multiple users, and many view their 6000s as interim machines . . . even if the interim is 4 to 5 years.



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Control Data, obviously, has always sought to pursue the practice of supplying large computers. The 1604, when it was announced in 1960, had about the same performance as IBM's 7090 computer at a lower price. Finally, now, it has broadened the scope of its product capability to the distributed network. This includes supplying the large central processor as well as outlying computer elements that may well be classed as minicomputers. All these elements seem to have been implemented in the 7600.

The course for CDC, therefore, is clear. What remains now is for it to beef up its marketing staff enough to gain the sales it projects . . . and needs. If this company indeed has the correct outlook, it could be in a position to supply more and more of the distributed computer networks in this country. IBM has not really announced its thinking in this direction, so CDC's competitive stature can not be measured. In the meantime, CDC is building more production capacity and is showing about a 50% yearly growth in shipments. And, with the added financial power it gained as a result of its merger with Commercial Credit, the company is in a position to keep growing at a rate significantly faster than the computer industry as a whole during the next three to five years.

## NEW REGISTRATIONS BY COMPUTER COMPANIES

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

**ACADEMY COMPUTING CORP.**

Academy Computing Corp., 4400 North Lincoln Blvd., Oklahoma City, Okla., a time-sharing service bureau, on Nov. 7 filed 300,000 common shares. The proceeds, at a price of $5 per share, will be used for expansion and for software improvements. The underwriter will be Shoemaker and Co., 110 Park Ave., Oklahoma City.

**COMPUTER ENTERPRISES, INC.**

Computer Enterprises, Inc., 1955 Merrick Road, Merrick, N.Y., a firm that operates data processing and computer programming schools and that franchises similar schools, on Nov. 14 filed 200,000 common. The proceeds, at a price of $2.50 per share, will be used for general corporate purposes. The underwriter will be Weinberg, Ost & Hayden, Inc., 52 Broadway, New York.

**MEDELEX SYSTEMS, INC.**

Medelex Systems, Inc., 889 Northern Blvd., Great Neck, N.Y., a company that proposes to develop, manufacture, and sell a "Brain Wave Control Computer," on Nov. 18 filed 250,000. The proceeds, at a price of $3 per share, will be used for research and development of the computer, for debt repayment, and for salaries. There will be no underwriter.

**NCC LEASING, INC.**

NCC Leasing, Inc., 699 South Mendenhall Road, Memphis, Tenn., a leasing company, on Nov. 12 filed $5.8 million of convertible subordinated debentures. The proceeds, at a price of 100% of the principal amount, will be used for debt reduction and for the purchase of computers. The interest rate will be supplied by amendment. The underwriter will be Scheinman, Hochstein and Trotta, Inc., 111 Broadway, New York.



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF OCTOBER 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $4600 | 1/54 | 24 | 3 | 27 | X |
| | 220 | $14,000 | 10/58 | 27 | 2 | 29 | X |
| | B100 | $2800 | 8/64 | 163 | 27 | 190 | 2 |
| | B200 Series | $5400 | 11/61 | 461 | 84 | 545 | 8 |
| | B300 Series | $9000 | 7/65 | 427 | 93 | 520 | 80 |
| | B500 | $3800 | 10/68 | 0 | 0 | 0 | 105 |
| | B2500 | $5000 | 2/67 | 68 | 13 | 81 | 120 |
| | B3500 | $14,000 | 5/67 | 79 | 16 | 95 | 230 |
| | B5500 | $25,000 | 3/63 | 79 | 8 | 87 | 5 |
| | B6500 | $33,000 | 6/69 | 0 | 0 | 0 | 60 |
| | B7500 | $44,000 | 9/69 | 0 | 0 | 0 | 18 |
| | B8500 | $200,000 | 12/68 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $1600 | 7/55 | 274 | 12 | 286 | X |
| | G-20 | $15,500 | 4/61 | 18 | 2 | 20 | X |
| | LGP-21 | $725 | 12/62 | 148 | 3 | 151 | X |
| | LGP-30 | $1300 | 9/56 | 107 | 5 | 112 | X |
| | RPC-4000 | $1875 | 1/61 | 49 | 4 | 53 | X |
| | 160*/160A/160C | $2100/$5000/$12,000 | 5/60;7/61;3/64 | 465 | 39 | 504 | X |
| | 924/924A | $11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $45,000 | 1/60 | 48 | 3 | 51 | X |
| | 1700 | $3800 | 5/66 | 128 | 54 | 182 | 110 |
| | 3100/3150 | $10,000 | 12/64 | 103 | 23 | 126 | 23 |
| | 3200 | $14,000 | 5/64 | 46 | 16 | 62 | X |
| | 3300 | $20,000 | 9/65 | 107 | 27 | 134 | 26 |
| | 3400 | $18,000 | 11/64 | 15 | 4 | 19 | X |
| | 3500 | $25.000 | 8/68 | 3 | 0 | 3 | 25 |
| | 3600 | $52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $53,000 | 2/66 | 19 | 3 | 22 | 2 |
| | 6400/6500 | $56,000 | 5/66 | 44 | 15 | 59 | 30 |
| | 6600 | $115,000 | 8/64 | 42 | 11 | 53 | 17 |
| | 7600 | $235,000 | 11/68 | 0 | 0 | 0 | 2 |
| Digital Equipment Corp. | PDP-1 | $3400 | 11/60 | 55 | 3 | 58 | X |
| | PDP-4 | $1700 | 8/62 | 49 | 5 | 54 | X |
| | PDP-5 | $900 | 9/63 | 97 | 11 | 108 | X |
| | PDP-6 | $10,000 | 10/64 | 14 | 5 | 19 | X |
| | PDP-7 | $1300 | 11/64 | 142 | 41 | 183 | 3 |
| | PDP-8 | $525 | 4/65 | 1760 | 490 | 2250 | 50 |
| | PDP-9 | $1100 | 12/66 | 181 | 49 | 230 | 32 |
| | PDP-10 | $9000 | 10/67 | 23 | 5 | 28 | 26 |
| Electronic Associates | 640 | $1200 | 9/67 | 44 | 21 | 65 | 25 |
| | 8400 | $12,000 | 6/65 | 19 | 6 | 25 | 3 |
| EMR Computer Division | ASI 210 | $3850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $4200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $4400 | 4/65 | 16 | 0 | 16 | 2 |
| | ADVANCE 6040 | $5600 | 7/65 | 7 | 3 | 10 | 3 |
| | ADVANCE 6050 | $9000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $1550 | 10/67 | 20 | 4 | 24 | 20 |
| General Electric | 115 | $2200 | 12/65 | 370 | 490 | 860 | 360 |
| | 130 | $4500 | 3/69 | 0 | 0 | 0 | 130 |
| | 205 | $2900 | 6/64 | 14 | 0 | 14 | X |
| | 210 | $16,000 | 7/59 | 35 | 0 | 35 | X |
| | 215 | $6000 | 9/63 | 20 | 3 | 23 | X |
| | 225 | $8300 | 4/61 | 145 | 20 | 165 | X |
| | 235 | $12,500 | 4/64 | 112 | 23 | 135 | 17 |
| | 405 | $6000 | 2/68 | 32 | 8 | 40 | 48 |
| | 415 | $11,000 | 5/64 | 331 | 109 | 440 | 40 |
| | 425 | $18,000 | 6/64 | 114 | 33 | 147 | 33 |
| | 435 | $25,000 | 9/65 | 31 | 9 | 40 | 15 |
| | 625 | $50,000 | 4/65 | 34 | 6 | 40 | 9 |
| | 635 | $60,000 | 5/65 | 47 | 6 | 53 | 22 |
| | 645 | $90,000 | 7/66 | 7 | 0 | 7 | 2 |
| | GE-PAC 4020 | $5000 | 2/67 | 47 | 18 | 65 | 85 |
| | GE-PAC 4040 | $3000 | 8/64 | 43 | 14 | 57 | 9 |
| | GE-PAC 4050 | $7000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $8500 | 6/65 | 16 | 2 | 18 | 2 |
| Hewlett-Packard | 2000A | $2500 | 11/68 | 0 | 0 | 0 | 62 |



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AS OF OCTOBER 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $2500 | 5/63 | 74 | 2 | 76 | X |
| | DDP-116 | $900 | 4/65 | 199 | 41 | 240 | 15 |
| | DDP-124 | $2050 | 3/66 | 55 | 17 | 72 | 16 |
| | DDP-224 | $3300 | 3/65 | 48 | 10 | 58 | 2 |
| | DDP-516 | $700 | 9/66 | 128 | 46 | 174 | 130 |
| | H-110 | $2500 | 9/68 | 2 | 0 | 2 | 105 |
| | H-120 | $4000 | 1/66 | 760 | 180 | 940 | 100 |
| | H-125 | $5000 | 12/67 | 47 | 8 | 55 | 100 |
| | H-200 | $8600 | 3/64 | 813 | 342 | 1155 | 100 |
| | H-400 | $8500 | 12/61 | 53 | 37 | 90 | X |
| | H-632 | $3500 | 11/68 | 0 | 0 | 0 | 40 |
| | H-800 | $28,000 | 12/60 | 60 | 14 | 74 | X |
| | H-1200 | $10,000 | 2/66 | 208 | 52 | 260 | 94 |
| | H-1250 | $12,000 | 8/68 | 4 | 0 | 4 | 49 |
| | H-1400 | $14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $16,000 | 1/66 | 111 | 22 | 133 | 73 |
| | H-4200 | $20,500 | 9/68 | 1 | 0 | 1 | 24 |
| | H-8200 | $50,000 | 12/68 | 0 | 0 | 0 | 10 |
| IBM | 305 | $3600 | 12/57 | 65 | 25 | 90 | X |
| | 360/20 | $2800 | 12/65 | 5300 | 3700 | 9000 | 2800 |
| | 360/25 | $5330 | 1/69 | 0 | 0 | 0 | 2400 |
| | 360/30 | $9300 | 5/65 | 5120 | 3580 | 8700 | 1050 |
| | 360/40 | $19,500 | 4/65 | 2820 | 1060 | 3880 | 560 |
| | 360/44 | $15,000 | 7/66 | 295 | 85 | 380 | 80 |
| | 360/50 | $33,000 | 8/65 | 995 | 265 | 1260 | 780 |
| | 360/65 | $70,000 | 11/65 | 521 | 99 | 620 | 310 |
| | 360/67 | $138,000 | 6/66 | 40 | 10 | 50 | 34 |
| | 360/75 | $81,400 | 1/66 | 33 | 8 | 41 | 15 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 22 |
| | 360/90 Series | $150,000 | 11/67 | 6 | 0 | 6 | 13 |
| | 650 | $4800 | 11/54 | 90 | 28 | 118 | X |
| | 1130 | $1700 | 2/66 | 3250 | 1300 | 4550 | 3200 |
| | 1401 | $6200 | 9/60 | 3550 | 2100 | 5650 | X |
| | 1401-G | $2300 | 5/64 | 675 | 645 | 1320 | X |
| | 1401-H | $1300 | 6/67 | 282 | 188 | 470 | 90 |
| | 1410 | $17,000 | 11/61 | 355 | 200 | 555 | X |
| | 1440 | $4100 | 4/63 | 1800 | 1300 | 3100 | 30 |
| | 1460 | $9800 | 10/63 | 685 | 135 | 820 | X |
| | 1620 I, II | $4000 | 9/60 | 915 | 495 | 1410 | X |
| | 1800 | $5100 | 1/66 | 427 | 153 | 580 | 300 |
| | 7010 | $26,000 | 10/63 | 141 | 24 | 165 | X |
| | 702 | $6900 | 2/55 | 4 | 0 | 4 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $32,000 | 12/55 | 19 | 2 | 21 | X |
| | 7040 | $25,000 | 6/63 | 59 | 44 | 103 | X |
| | 7044 | $36,500 | 6/63 | 89 | 32 | 121 | X |
| | 705 | $38,000 | 11/55 | 29 | 5 | 34 | X |
| | 7070, 2, 4 | $27,000 | 3/60 | 160 | 87 | 247 | X |
| | 7080 | $60,000 | 8/61 | 78 | 3 | 81 | X |
| | 709 | $40,000 | 8/58 | 3 | 0 | 3 | X |
| | 7090 | $63,500 | 11/59 | 30 | 6 | 36 | X |
| | 7094 | $75,500 | 9/62 | 96 | 3 | 99 | X |
| | 7094 II | $82,500 | 4/64 | 111 | 9 | 120 | X |
| National Cash Register | NCR-304 | $14,000 | 1/60 | 21 | 2 | 23 | X |
| | NCR-310 | $2500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $8700 | 5/62 | 510 | 270 | 780 | 35 |
| | NCR-315-RMC | $12,000 | 9/65 | 89 | 21 | 110 | 24 |
| | NCR-390 | $1850 | 5/61 | 300 | 250 | 550 | X |
| | NCR-500 | $1500 | 10/65 | 1800 | 1000 | 2800 | 400 |
| | Century 100 | $2645 | 9/68 | 10 | 0 | 10 | 700 |
| | Century 200 | $7500 | 2/69 | 0 | 0 | 0 | 420 |
| Philco | 1000 | $7010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $40,000 | 10/58 | 13 | 1 | 14 | X |
| | 2000-212 | $52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $7000 | 2/61 | 401 | 207 | 608 | X |
| | RCA 3301 | $18,000 | 7/64 | 75 | 10 | 85 | X |
| | RCA 501 | $14,000 | 6/59 | 78 | 2 | 80 | X |
| | RCA 601 | $35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $4100 | 9/65 | 148 | 64 | 212 | 67 |
| | Spectra 70/25 | $6700 | 9/65 | 91 | 35 | 126 | 42 |
| | Spectra 70/35 | $8000 | 1/67 | 125 | 55 | 180 | 140 |
| | Spectra 70/45 | $23,000 | 11/65 | 199 | 61 | 260 | 70 |
| | Spectra 70/46 | $33,400 | 10/68 | 0 | 0 | 0 | 5 |
| | Spectra 70/55 | $33,300 | 11/66 | 13 | 2 | 15 | 16 |
| Raytheon | 250 | $1200 | 12/60 | 124 | 49 | 173 | X |
| | 440 | $3500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $3200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp | 650 | $500 | 5/66 | 25 | 0 | 25 | 0 |
| | 655 | $1800 | 10/66 | 65 | 0 | 65 | 12 |
| | 660 | $2000 | 10/65 | 9 | 0 | 9 | 5 |
| | 670 | $2600 | 5/66 | 1 | 0 | 1 | 0 |
| | 4700 | $800 | 2/69 | 0 | 0 | 0 | 2 |
| Scientific Data Systems | SDS-92 | $1500 | 4/65 | 127 | 6 | 133 | 2 |
| | SDS-910 | $2000 | 8/62 | 208 | 15 | 223 | 2 |
| | SDS-920 | $2900 | 9/62 | 184 | 8 | 192 | 4 |
| | SDS-925 | $3000 | 12/64 | 58 | 2 | 60 | 4 |
| | SDS-930 | $3400 | 6/64 | 221 | 25 | 246 | 8 |
| | SDS-940 | $13,000 | 4/66 | 33 | 0 | 33 | 20 |
| | SDS-9300 | $8500 | 11/64 | 33 | 2 | 35 | 2 |
| | Sigma 2 | $1800 | 12/66 | 115 | 15 | 130 | 170 |
| | Sigma 5 | $6300 | 8/67 | 36 | 12 | 48 | 65 |
| | Sigma 7 | $12,000 | 12/66 | 34 | 10 | 44 | 22 |
| Standard Computer Corp | IC6000 | $18,000 | 5/67 | 13 | 0 | 13 | 12 |
| | IC4000 | $10,000 | 9/68 | 1 | 0 | 1 | 2 |
| Systems Eng Labs | 810 | $1000 | 9/65 | 22 | 2 | 24 | X |
| | 810A | $900 | 8/66 | 88 | 10 | 98 | 26 |
| | 840 | $1400 | 11/65 | 4 | 0 | 4 | X |
| | 840A | $1400 | 8/66 | 66 | 2 | 68 | 16 |
| UNIVAC | I & II | $25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $21,000 | 8/62 | 75 | 13 | 88 | X |
| | File Computers | $15,000 | 8/56 | 10 | 0 | 10 | X |
| | SS 80, 90 & Step | $8000 | 8/58 | 107 | 73 | 180 | X |
| | 418 | $11,000 | 6/63 | 103 | 53 | 156 | 18 |
| | 490 Series | $30,000 | 12/61 | 196 | 30 | 226 | 34 |
| | 1004 | $1900 | 2/63 | 1820 | 1030 | 2850 | 10 |
| | 1005 | $2400 | 4/66 | 880 | 400 | 1280 | 70 |
| | 1050 | $8500 | 9/63 | 188 | 86 | 274 | 5 |
| | 1101-1105 | $35,000 | 12/50 | 7 | 0 | 7 | X |
| | 1107 | $57,000 | 10/62 | 20 | 8 | 28 | X |
| | 1108 | $68,000 | 9/65 | 98 | 36 | 134 | 90 |
| | 9200 | $1500 | 6/67 | 265 | 70 | 335 | 640 |
| | 9300 | $3400 | 9/67 | 128 | 42 | 170 | 490 |
| | 9400 | $7000 | 5/69 | 0 | 0 | 0 | 118 |
| | LARC | $135,000 | 5/60 | 2 | 0 | 2 | X |
| | | | TOTALS | 46,855 | 22,225 | 69,080 | 18,177 |

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.



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November 4 - November 15, 1968

| NEW YORK STOCK EXCHANGE | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| Addressograph-Multigraph | 91 7/8 | 52 | 2550 | 85 1/4 | 76 1/2 | 83 | + 3 3/4 | + 4.73 |
| American R & D | 207 | 122 1/2 | 290 | 164 1/2 | 150 1/2 | 163 | + 7 1/2 | + 4.82 |
| Ampex Corp. | 38 | 26 1/2 | 2474 | 37 | 33 1/4 | 36 3/8 | + 7/8 | + 2.46 |
| Bunker Ramo | 21 3/8 | 15 | 5740 | 17 5/8 | 15 | 17 3/8 | + 1 7/8 | +12.10 |
| Burroughs | 239 5/8 | 157 | 993 | 232 5/8 | 218 3/4 | 232 | + 6 | + 2.65 |
| Collins Radio | 101 1/8 | 53 | 839 | 66 1/2 | 58 | 66 1/2 | + 7 | +11.76 |
| Control Data | 156 | 124 1/4 | 3597 | 147 1/2 | 133 3/4 | 141 3/4 | + 4 5/8 | + 3.37 |
| Electronic Assoc. | 27 3/8 | 18 | 2022 | 26 | 22 3/4 | 24 | + 1 1/8 | + 4.92 |
| General Electric | 100 | 80 1/4 | 2592 | 98 | 93 1/2 | 96 3/4 | + 2 5/8 | + 2.79 |
| Honeywell | 139 3/4 | 89 3/8 | 1545 | 119 1/2 | 113 | 119 1/8 | + 3 7/8 | + 3.36 |
| IBM | 375 | 304 1/2 | 2828 | 327 1/4 | 307 1/2 | 327 | +18 | + 5.83 |
| ITT | 62 | 44 7/8 | 2400 | 60 | 56 1/2 | 60 | + 1 5/8 | + 2.78 |
| Litton | 104 3/4 | 62 | 1827 | 82 1/4 | 77 1/8 | 82 | + 2 5/8 | + 3.31 |
| Memorex | 93 1/2 | 61 1/2 | 1208 | 84 | 73 1/4 | 81 3/4 | + 7 1/2 | +10.10 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 1217 | 123 5/8 | 117 | 121 3/4 | + 4 1/4 | + 3.62 |
| RCA | 55 | 44 1/4 | 3630 | 48 3/4 | 45 7/8 | 47 1/2 | + 1 | + 2.15 |
| Raytheon | 54 | 33 1/4 | 2108 | 50 | 42 1/8 | 48 5/8 | + 5 3/8 | +12.42 |
| Sanders | 66 1/2 | 41 3/4 | 1909 | 61 5/8 | 50 1/8 | 61 1/2 | +12 | +24.24 |
| Scientific Data | 117 1/2 | 79 3/4 | 1742 | 90 3/8 | 81 1/2 | 90 | + 8 1/4 | +10.09 |
| SCM | 61 1/4 | 35 3/4 | 2061 | 41 3/4 | 38 1/2 | 40 3/4 | + 1 3/4 | + 4.49 |
| Singer | 88 7/8 | 62 3/4 | 1007 | 86 3/4 | 83 1/4 | 86 | + 1 5/8 | + 1.47 |
| Sperry Rand | 63 3/8 | 41 3/8 | 3644 | 47 | 41 3/4 | 45 3/4 | + 3 3/4 | + 8.93 |
| Teledyne | 143 7/8 | 90 1/8 | 2742 | 97 3/4 | 91 1/2 | 97 3/4 | + 5 1/4 | + 5.68 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 4.88 | + 6.44 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 66 1/4 | 42 | 147 | 64 7/8 | 60 | 64 7/8 | + 4 1/2 | + 7.45 |
| Cal. Comp. | 53 1/4 | 26 3/4 | 562 | 38 7/8 | 33 5/8 | 38 3/4 | + 4 7/8 | +14.39 |
| Clary Corp. | 32 3/8 | 12 1/4 | 1168 | 22 1/2 | 19 5/8 | 20 3/4 | + 1 | + 5.06 |
| Computer Applications | 42 5/8 | 17 5/8 | 684 | 22 | 17 5/8 | 21 1/4 | + 3/4 | + 3.66 |
| Computer Sciences | 64 3/4 | 31 5/8 | 719 | 59 1/2 | 52 3/4 | 59 3/8 | + 6 1/2 | +12.21 |
| Computing and Software | 84 1/4 | 43 1/2 | 207 | 84 1/4 | 71 1/2 | 81 | + 9 | +12.50 |
| Data Proc. Fin. & Gen. | 184 | 85 3/4 | 2023 | 123 | 92 | 119 1/4 | +27 1/8 | +29.44 |
| Digital Equipment | 160 | 95 1/4 | 187 | 151 1/4 | 139 1/4 | 149 1/2 | + 9 1/8 | + 6.50 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 146 | 31 1/2 | 28 5/8 | 29 3/8 | + 1 1/8 | + 3.69 |
| Granite Computer Leasing | 58 7/8 | 43 | 419 | 46 5/8 | 43 | 43 1/2 | + 1 | + 2.25 |
| Greyhound Computer | 43 1/4 | 25 | 622 | 27 5/8 | 25 | 26 1/4 | + 7/8 | + 3.45 |
| Leasco | 126 | 70 3/4 | 1945 | 126 | 100 | 126 | +22 1/8 | +21.29 |
| Levin-Townsend Comp. Corp. | 67 | 47 5/8 | 2029 | 57 1/8 | 52 3/4 | 56 5/8 | + 3 3/8 | + 6.34 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 1937 | 29 3/4 | 20 1/2 | 27 | + 3 | +12.50 |
| Mohawk Data Scineces | 107 1/2 | 58 | 2101 | 70 1/2 | 60 1/2 | 69 1/2 | + 7 1/4 | +11.65 |
| Planning Research | 59 1/2 | 28 | 554 | 59 1/2 | 51 1/4 | 59 1/2 | + 5 1/2 | +10.19 |
| Potter Instrument | 38 1/2 | 20 1/2 | 1217 | 33 3/4 | 28 1/8 | 32 7/8 | + 3 7/8 | +13.36 |
| Randolph Computers | 64 | 34 5/8 | 1818 | 43 1/4 | 36 5/8 | 41 3/4 | + 2 3/4 | + 7.05 |
| Systems Eng. Labs. | 42 5/8 | 26 5/8 | 1069 | 30 1/4 | 26 5/8 | 29 3/8 | + 2 1/8 | + 7.79 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 6.04 | +10.04 |

| OVER-THE-COUNTER | 1968 High Bid | 1968 Low Bid | November 15 Bid | November 15 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 36 | 14 1/2 | 36 | 38 | 33 | + 3 | + 9.09 |
| Aries Corp. | 24 | 12 1/2 | 14 3/4 | 15 1/2 | 13 3/4 | + 1 | + 7.27 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 14 3/4 | 15 1/2 | 14 3/4 | -- | -- |
| Computer Usage | 62 | 28 1/2 | 37 1/2 | 39 1/2 | 31 1/2 | + 6 | +19.05 |
| Cyber-tronics | 19 | 10 1/2 | 12 3/8 | 12 7/8 | 11 1/2 | + 7/8 | + 7.61 |
| Data Products | 23 | 13 | 18 | ** | 16 1/2 | + 1 1/2 | + 9.09 |
| Digitronics | 27 1/2 | 16 1/2 | 22 1/2 | 24 | 17 3/4 | + 4 3/4 | +26.76 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 14 3/4 | 14 7/8 | 14 1/8 | + 5/8 | + 4.42 |
| Electronic Memories | 57 1/2 | 32 3/4 | 51 1/4 | 52 1/4 | 48 | + 3 1/4 | + 6.77 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 12 3/8 | 12 7/8 | 13 | - 5/8 | - 4.81 |
| Informatics, Inc. | 68 | 32 | 65 | ** | 63 | + 2 | + 3.17 |
| LMC Data, Inc. | 16 | 7 | 8 1/4 | 8 3/4 | 8 | + 1/4 | + 3.13 |
| Management Assistance | 16 3/4 | 9 1/4 | 14 | 14 3/8 | 13 3/8 | + 5/8 | + 4.67 |
| Optical Scanning Corp. | 145 | 71 | 126 | 130 | 128 | - 2 | - 1.56 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 79 | 81 | 82 | - 3 | - 3.66 |
| Standard Computers | 55 | 30 | 44 | 46 | 41 1/2 | + 2 1/2 | + 6.02 |
| Tally Corp. | 51 1/2 | 33 | 40 | 42 | 35 | + 5 | +14.29 |
| TBS Computer Centers Corp. | 21 3/4 | 11 1/4 | 11 3/4 | 12 1/2 | 12 1/4 | - 1/2 | - 4.08 |
| University Computing | 182 | 57 | 182 | 187 | 151 | +31 | +20.53 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 23,1968 • VOL.4,NO.9 P.J.McGOVERN,EDITOR

## CDC goes to court

### "PAPER MACHINES AND PHANTOM COMPUTERS"

That's probably the most gutsy charge in the 30-page complaint that Control Data Corp. filed against International Business Machines Corp. in the U.S. District Court of Minnesota, in St. Paul, on December 11. Just before noon that Wednesday CDC lawyers filed "in order to recover damages for past violations and to obtain injunctive relief against continuing violations" of the Sherman (Antitrust) Act.

News of this action rapidly spread to the exhibit floor of the Fall Joint Computer Conference, in progress in San Francisco. Almost every first reaction from the computer industry executives, technical experts, and observers present was a startled: "What does it mean?"

The complaint, itself, is filled with much background on the computer industry and on IBM's position in it. Two broad violations of law are charged by CDC: "monopolization" and "attempt to monopolize." Backing up these charges, the complaint gives 12 specific paragraphs outlining IBM's "monopoly power in the computer markets and submarkets" followed by a list of 37 "specific exclusionary practices." Because of these alleged "violations," CDC asks, primarily, for the court to provide relief -- "including dissolution of the business or divesture of properties of Defendant IBM" -- and to judge in favor of "treble the amount of its actual damages, as provided by law."

## IBM answers the charges

The day after CDC filed its complaint, IBM responded with a rather short statement in which it termed the allegations to be unfounded. Here, verbatim, is the text of IBM's statement released on December 12:

> International Business Machines Corporation said today that it has had an opportunity to review the antitrust complaint filed against it yesterday by its spectacularly successful competitor, Control Data Corporation. The allegations made by Control Data, IBM believes, are unfounded, and IBM stated that it will vigorously defend itself against this action.
>
> Preliminary study of the complaint indicates that Control Data appears to make two mutually inconsistent, and equally baseless, assertions:
>
> -that the data processing industry is not competitive;
> -that there has been excessive competition which has been contrary to the public interest and unfair to Control Data.

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It is IBM's view that the data processing industry is highly competitive. IBM's major competitors are among this country's most powerful and capable companies and they uniformly have indicated that they regard data processing as an exceptional growth opportunity. In addition to Control Data, the industry includes companies such as General Electric, RCA, Honeywell, Sperry Rand, NCR, and Burroughs. In less than two decades the industry has grown to the point that there are now scores of companies manufacturing central processing units; as many more are producing peripheral equipment used with computers; and hundreds of programming and systems support firms and service bureaus have entered the industry.

CDC's own success, since it was founded in 1957, proves that a company need not be powerful to enter the data processing industry and succeed. Starting with less than $1 million in capital, Control Data's assets have grown to more than $465 million. Its sales for 1968 were more than 25 times its sales ten years earlier, and rose by more than 42 per cent between 1967 and 1968 alone. Control Data complains particularly about IBM's announcement of its System/360 early in 1964 yet by 1968 (fiscal year ending June 30), Control Data's net earnings were more than 11 times its net earnings in the year preceding the System/360 announcement.

Control Data's second claim is that there has been too much competition. But the natural result of this competition has been lower prices and better machines. Technological innovation stemming from such competition has meant, for data processing users, that over a 15-year period computers increased in speed 150-fold and the cost of an individual computation was reduced to a 40th or less of its previous level.

Control Data's own past statements are inconsistent with its present claim that competition from IBM damaged Control Data. In June, 1964, two months after the announcement of IBM's System/360, CDC claimed a "record volume of new orders." More recently, Control Data's 1968 annual report stated, "We are entering the new year with a business backlog which shows a healthy increase over what it was a year ago," and, "The cumulative value of installed 6000 series computers increased over 60 per cent during the year. This is a much greater growth rate than that of the overall computer market."

Addressing a group of security analysts in October, 1968--less than two months ago--Control Data's chief executive officer said the areas of the computer market growing most rapidly "are those of very large computer systems, peripheral equipment and terminals." He went on to say of these fast-growing market areas, "Our well-established worldwide leadership in very large computers, with our present 6000 series of super computers, of course, gives us a commanding position today in the fastest growing area of the market." He said Control Data "is also in a strong position" in the areas of remote access computing and peripheral equipment.

Both IBM and CDC have had great success in the expanding, changing data processing industry, with CDC growing faster than IBM. IBM intends in the future, as it has in the past, to compete vigorously and fairly.



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Specifics of the CDC allegations

After building its case to show that IBM has "monopolized" the computer industry, CDC, in its complaint, lists a series of "exclusionary practices," some rather strong. Constituting paragraph 23, and about half the complaint, these are the practices for which CDC specifically asks a restraining injunction. Here, in full, is the text of paragraph 23:

EXCLUSIONARY PRACTICES.

23. Defendant IBM, directly and through its subsidiaries, has wilfully acquired and maintained monopoly power in the computer markets and submarkets, or has had the specific intent to obtain such power, in that it has consciously, deliberately, or intentionally engaged in the following acts, behavior, conduct and practices, among others:

Development, Delivery, and Performance of Hardware and Software - "Paper Machines and Phantom Computers".

(a) It has misrepresented the status of design, development, production, and performance of certain of its computers, and programs of software for certain computers, particularly with regard to the capabilities and availability of large size computers, time sharing computers, and compatibility between models of computers, all for the purpose or with the effect of depriving customers of the opportunity to accurately evaluate competitive computers, thus obtaining or retaining customers for itself and depriving Plaintiff and other manufacturers of sales;

(b) It has, as a means of obtaining or retaining customers and depriving Plaintiff and other manufacturers of sales, offered to lease, sell, or make delivery of, and has entered into agreements to lease, sell, or make delivery of computers, software or programs which were not yet in production, for which it was not ready to commence production, and as to which it had no reasonable basis for believing that production or delivery could be accomplished within the time periods specified by such offers or agreements;

(c) It has, having prematurely announced and marketed its computers to deprive its competitors of sales and due to computer development and production deficiencies arising from such prematurity, frequently changed and delayed its previously announced or promised delivery schedules as well as announced or introduced changes in, or cancellations of, certain types or models of computers, their specifications and alleged capabilities, thereby creating confusion in the market and, at great cost to its competitors and its customers, deferring procurements until its competitive deficiencies could be discovered or overcome and maximizing its revenues on outdated computers on lease;

(d) It has repeatedly entered into contracts, commitments, and letters of intent in which it was obligated to furnish computers and software and, having deprived its competitors of such sales, has then failed to fulfill the obligations undertaken in such contracts, commitments, and letters of intent;

(e) It has consistently induced customers, upon the execution of a contract with it, or even prior thereto, to expend substantial sums of money



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preparing data, training personnel, preparing a site for the computer, and preparing for the use of certain software or programs, all for the purpose or with the effect of irrevocably tying the customer to its computer irrespective of actual delivery or performance of the computer or software thereby precluding said customers from acquiring computers from Plaintiff and other manufacturers;

The actions of Defendant IBM alleged in the foregoing subparagraphs (a) through (e) were taken with knowledge of and to take advantage of its dominant position in the computer markets and submarkets. Because of the large dollar investment in computers, their complexity, and difficulties of verifying claimed specifications of undelivered products, and a history of rapid technological obsolescence of computers, customers in the computer markets and submarkets readily rely upon representations and promises of Defendant IBM. This is particularly true when the representations concern a new product line of computers allegedly meeting all needs of customers and compatible from smallest to largest.

Discriminatory and Exclusionary Pricing Practices.

(f) It has directly and indirectly offered discriminatory prices and discriminatory services and technical assistance to some customers not given to other customers, including, among others, outright discounts from standard published prices, free "trial" computer usage for extended periods of time, buybacks of computer time which it may or may not utilize, discounts in the form of fictitious "value received" contracts, extended purchase plans, and unusual and substantial commitments of free manpower for programming, maintenance and systems support. The recipients of such prejudicial favoritism are typically customers or members of a class of customers where:

(i) Defendant IBM's market share or power is less dominant or it is threatened by and encountering more intense competition; or

(ii) Defendant IBM stands to gain certain ancillary benefits or prestige in furtherance of its predominant position in the computer markets and submarkets;

(g) It has established sale and lease prices for some types or models of computers at levels which would result in a significantly lower percentage of return on gross receipts and investment than was realized from the prices established for other computers with respect to which it has a more dominant market position, or, with respect to whcih Plaintiff or other competitors have not threatened its market position, and it has used its profits or revenues from the sale or lease of some types or models of computers to subsidize its activities with respect to the marketing of types or models threatened by competition;

(h) It has sold or leased computers to customers located in some geographical areas at a lower rate of return on investment or sales than is realized in other geographical areas;

(i) It has sold or leased some computers at a loss for the purpose or with the effect of hindering competition;

(j) It has offered discriminatory prices and other concessions to hold its existing customers and to thereby discourage them from replacing Defendant IBM's computers with computers manufactured by others, including:



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(i) The allowance of substantially reduced rentals on its installed computers during, and sometimes beyond, the period such computers are being replaced, but only if they are being replaced by Defendant IBM's computers; and
(ii) The allowance of a portion of the rentals paid Defendant IBM by a user with respect to an installed computer as a credit toward the purchase of that computer or, more significantly, toward the purchase of a different model computer, provided it is a computer manufactured by Defendant IBM;

(k) It has marketed and tied together as a package certain products and services, such as maintenance services to leased computers as well as certain software to sold or leased computers, rather than separately pricing each product or service, for the purpose or with the effect of:

(i) Preventing the creation of hardware maintenance companies independent of computer manufacturers;
(ii) Hindering the development of software companies independent of computer manufacturers;
(iii) Camouflaging the grant of discriminatory prices and concessions; and
(iv) Requiring any potential competitor in the computer markets or submarkets to have large aggregations of capital in order to effectively compete;

Exploitation of Size to Structure the Computer Markets and Submarkets.

(l) It has set technical standards, frequently unnecessary and without prior notice to the industry or customers, which standards were in part designed to or had the effect of reducing the marketability of the computers or peripheral equipment of its competitors, permanently or at least temporarily until such time as they conformed to such standards or until customers determined that the standards were not required;

(m) It has formed joint ventures with its customers and customer groups on a discriminatory basis to develop new computer program languages for use in its marketing efforts, and has then used its predominant position in such ventures to deny Plaintiff and other competitors and their customers participation therein or access to the achievements thereof;

(n) It has created an undue financial burden on its competitors and potential competitors, prevented development or growth of independent computer maintenance organizations and a used computer market and, generally, retained control over the majority of computers in use and promoted continuous customer dependence on and contact with it, by consistently encouraging leasing and discouraging sale of computers in the following ways, among others:

(i) Trading upon customers' fear of rapid obsolescence of computers as a market characteristic, and compounding that characteristic by repeatedly, and often unnecessarily, introducing new models, rapidly changing model numbers and otherwise creating uncertainty and confusion among customers;
(ii) Pricing its computers to make leasing costs, either in fact or in appearance, economically more advantageous than purchase costs, particularly as compared with prices of its competitors;



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(iii) Increasing maintenance charges on purchased computers without corresponding increases for maintenance included in rental prices;
(iv) Making available certain of the price concessions referred to in subparagraph (j) above to customers leasing its computers but not making comparable concessions to purchasers;
(v) Establishing low trade-in values for used computers which were initially sold new by it despite maintaining resale prices for its used computers at levels near the price for new computers of the same model;
(vi) Lowering charges for overtime use of rented computers without corresponding decreases in purchase prices; and
(vii) Adjusting the discount available for purchase of installed computers on rental with the effect of discouraging immediate purchase;

(o) It has unreasonably stressed and exploited its predominant market position by, among other things, carrying on multimillion dollar advertising campaigns wherein it has touted, for example, its extensive installations of computers in all industries and geographical areas, its software library and the libraries of its user organizations, as well as its massive force of systems analysts, maintenance, and other personnel, all in order to lead customers to believe that its computers, software, and total services are superior to Plaintiff's and other competitors' and that it above all other competitors offers complete understanding of and solutions to the diverse problems, requirements, fears and desires of all customers;

Coercion of Employees.

(p) It has encouraged its salesmen and other personnel to employ the marketing practices alleged herein and other anticompetitive practices by imposing unreasonable quotas and severe penalties for the loss of orders, customers, or prospects;

(q) It has imposed unreasonable barriers against its employees working for competitors following termination of their employment with Defendant IBM;

Coercion In and Improper Influence of Customer Procurements.

(r) It has directed threats, expressed or implied, and other forms of intimidation and coercion, at customer procurement personnel to influence their judgment and induce the acquisition of its computers without regard to price or performance and thereby discourage and prevent the acquisition of computers manufactured by competitors;

(s) It has offered computers to customers upon terms which include an unreasonable requirement of immediate acceptance by the customers, thereby imposing unreasonable pressure to decide immediately without giving due consideration to computers of competitors;

(t) It has, upon learning of a customer's impending decision to acquire a competitor's computer, sought to delay or impede that decision by reopening the evaluation or submitting new proposals, and it has otherwise wrongfully interfered with and attempted to terminate negotiations or contracts between customers and competitors, thus delaying or depriving competitors of sales and creating additional expenses for customers;



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(u) It has unreasonably refused to extend leases of its computers, pending the delivery of replacement computers, for customers who have contracted to replace such computers with those of competitors;

(v) It has participated or attempted to participate with customers in the preparation and evaluation of plans for procurement, specifications, requests for procurement and "benchmark" tests for the purpose or with the effect of preventing such customers from enjoying the advantages of competition as well as depriving competitors of sales;

(w) It has discouraged and sometimes refused to allow or to perform, tests comparing the performance of the computers proposed by it with the performance of the computers proposed by competitors, and on certain of those occasions where competitive tests have been insisted upon and undertaken, it has misrepresented the performance of its computers on such tests;

(x) It has unreasonably exploited the fact that a substantial number of procurement personnel employed by customers formerly were employed or trained on its computers and it has caused or arranged for its officers, directors, consultants to, or employees of customers, as well as causing or arranging for representatives of customers to hold similar positions with it, all for the purpose or with the effect of influencing customer procurement decisions and depriving competitors of sales;

Reciprocal Marketing Practices.

(y) It has built or located its plants and other facilities near the geographical locations of certain key customers, or it has referred to the probabilities of such action in the course of its efforts to market computers, for the purpose or with the effect of inducing the acquisition of its computers;

(z) It has utilized its reciprocal buying power to influence the computer procurement decisions of customers;

(aa) It has discriminatorily bestowed favors on certain selected customers, or their employees, by offering or making grants of funds or other economic assistance to such customers or employees, but tying said grants or assistance to a condition that its computers be acquired or retained by such customers;

Disparagement.

(bb) It has unfavorably represented and falsely disparaged Plaintiff's computers, software, maintenance policies, personnel, financial position and overall capabilities;

Exclusionary Contract Practices.

(cc) It has employed very informal, and frequently oral, negotiating and contracting techniques for the purposes or with the effects, among others, of encouraging premature customer preparation for receipt of its computers and of camouflaging and facilitating the unfair practices alleged herein. Said techniques have included:



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(i) The urging of customers to give to it informal orders or "letters of intent" to acquire an IBM computer, containing no terms or specifications and ostensibly designed to merely reserve for the customer a place on its delivery schedule without legally committing the customer, except that thereafter it pressures the customer to confirm its order or supposedly be eliminated from the delivery sequence;
(ii) The use of master contracts for many customers, originating with the first equipment the customer ever acquired from Defendant IBM--frequently tabulating equipment--and accordingly lacking written particulars concerning the terms, specifications, prices or manpower commitments made by Defendant IBM for the customer's subsequent computer procurements;

Discrimination Against Other Computer Manufacturers and Their Customers.

(dd) It has taken advantage of Plaintiff's and other of its competitors' dependence upon it as a source of certain peripheral equipment and supplies by refusing to deal with such companies, or by insisting upon restrictive terms and conditions, for the purpose or with the effect of financially injuring Plaintiff and other manufacturers and preventing them from competing;

(ee) It has established production and delivery schedules for replacement parts and components produced by it which are designed to give preference to users of its computers and discriminate against the users of Plaintiff's or other competitors' computers who, as part of their computer systems, must have access to replacement parts and components produced by Defendant IBM, to the detriment of its competitors and their customers;

Bait and Switch.

(ff) It has deceived customers and deprived Plaintiff of sales by securing contracts, commitments, or letters of intent from customers for computers, particularly large size computers, and having eliminated its competitors, sought to cancel the contract, commitment, or letter of intent and in lieu thereof, either market a computer more likely to be developed or delivered by it, or a more expensive computer more likely to fulfill the promises made to the customer;

Nonsequential Deliveries.

(gg) It has rearranged and manipulated its delivery schedules for computers in the light of competitive considerations by offering discriminatory delivery preferences to some customers at the expense of others;

Joint Marketing.

(hh) It has engaged in joint marketing efforts with The Service Bureau Corporation, its wholly owned subsidiary, and has used said subsidiary as well as its data centers and test centers as vehicles through which to lock-in customers and through which to grant discriminatory price concessions including free usage of computer time, free manpower for software support, and buybacks of computer time or programs;



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Consent Decree.

(ii) It has, contrary to the terms, conditions and intent of its 1956 Consent Decree, directly entered into the time-sharing service business, thereby exploiting its position as the dominant computer manufacturer as well as locking in potential computer customers;

Patents.

(jj) It has acquired several thousand United States and foreign patents, patent rights and options to obtain patent rights pertaining to computers and has used its patent position to entrench its monopoly power; and

Acquisition.

(kk) It acquired in 1964 the assets and business of Science Research Associates, Inc., a firm engaged in the development and publication of instructional materials in basic subjects for elementary schools, high schools, and universities, and the development and production of a variety of intelligence, aptitude and achievement tests, thereby entrenching its position in the developing market of computerized education.

## Consent decree

There is some precedent for action against IBM, although it lies in a suit brought in 1952 by the Justice Dept. for alleged monopoly activity in the punched card and card equipment field. This resulted in the consent decree of 1956, under which IBM had to get rid of half its punched card manufacturing capacity and put its service operations under the control of an independently operated subsidiary.

In the present complaint, CDC makes several references to this . . . some are reproduced above, another is in a paragraph in which CDC claims, "Despite the entry of a Final Judgement directed against Defendant IBM's power and activities in the tabulating systems industry, Defendant IBM built upon its power within that industry to achieve similar dominance in the computer markets and submarkets by the mid-1950's and has retained such power up to the present time."

## Analysis and prognosis

According to estimates by industry savants and informed sources close to both parties, the case will likely not be heard in court for two or three years. There is substantial commentary that the case, in part, is a marketing move on the part of CDC to protect the recently introduced 7600 (EDP/IR,Dec.5,1968); only time and subsequent actions will confirm or deny this. It is certain, from the extent of the complaint, that this action has been in preparation for quite some time. There may well be demands for documents, discovery procedures, and other legal formalities that take time and expense. It is quite safe to say, therefore, that this matter will prove exceedingly expensive to both parties, and the lawyers may be the real winners.

Any other anticipatory remarks would be premature at the very least. EDP/IR is currently making an energetic investigation of the CDC charges, and more will be reported at a later date. It is indeed true that, by its very nature and complexity, this suit certainly will qualify as one of the most important to date in the computer industry . . . and it could likely turn out to be a milestone case in the annals of American business.



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF NOVEMBER 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 24 | 3 | 27 | X |
| | 220 | $ 14,000 | 10/58 | 26 | 2 | 28 | X |
| | B100 | $ 2,800 | 8/64 | 150 | 25 | 175 | 2 |
| | B200 Series | $ 5,400 | 11/61 | 459 | 84 | 543 | 7 |
| | B300 Series | $ 9,000 | 7/65 | 435 | 95 | 530 | 90 |
| | B500 | $ 3,800 | 11/68 | 0 | 0 | 0 | 110 |
| | B2500 | $ 5,000 | 2/67 | 73 | 15 | 88 | 110 |
| | B3500 | $ 14,000 | 5/67 | 84 | 18 | 102 | 225 |
| | B5500 | $ 25,000 | 3/63 | 80 | 8 | 88 | 6 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 65 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 18 |
| | B8500 | $200,000 | 12/68 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 274 | 12 | 286 | X |
| | G-20 | $ 15,500 | 4/61 | 18 | 2 | 20 | X |
| | LGP-21 | $ 725 | 12/62 | 147 | 3 | 150 | X |
| | LGP-30 | $ 1,300 | 9/56 | 107 | 5 | 112 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 49 | 4 | 53 | X |
| | 160*/160A/160C | $2,100/$5,000/$12,000 | 5/60;7/61/3/64 | 464 | 39 | 503 | X |
| | 924/924A | $ 11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 48 | 3 | 51 | X |
| | 1700 | $ 3,800 | 5/66 | 133 | 57 | 190 | 100 |
| | 3100/3150 | $ 10,000 | 12/64 | 104 | 23 | 127 | 22 |
| | 3200 | $ 14,000 | 5/64 | 46 | 16 | 62 | X |
| | 3300 | $ 20,000 | 9/65 | 109 | 28 | 137 | 25 |
| | 3400 | $ 18,000 | 11/64 | 15 | 4 | 19 | X |
| | 3500 | $ 25,000 | 8/68 | 5 | 0 | 5 | 24 |
| | 3600 | $ 52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $ 53,000 | 2/66 | 19 | 3 | 22 | 2 |
| | 6400/6500 | $ 56,000 | 5/66 | 47 | 16 | 63 | 30 |
| | 6600 | $115,000 | 8/64 | 43 | 12 | 55 | 17 |
| | 7600 | $235,000 | 1/69 | 0 | 0 | 0 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 55 | 3 | 58 | X |
| | PDP-4 | $ 1,700 | 8/62 | 49 | 5 | 54 | X |
| | PDP-5 | $ 900 | 9/63 | 97 | 11 | 108 | X |
| | PDP-6 | $ 10,000 | 10/64 | 14 | 5 | 19 | X |
| | PDP-7 | $ 1,300 | 11/64 | 142 | 41 | 183 | 3 |
| | PDP-8 | $ 525 | 4/65 | 1,760 | 520 | 2,280 | 25 |
| | PDP-9 | $ 1,100 | 12/66 | 205 | 60 | 265 | 30 |
| | PDP-10 | $ 9,000 | 10/67 | 27 | 5 | 32 | 27 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 55 | 25 | 80 | 26 |
| | 8400 | $ 12,000 | 6/65 | 19 | 6 | 25 | 3 |
| EMR Computer Division | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 16 | 0 | 16 | 2 |
| | ADVANCE 6040 | $ 5,600 | 7/65 | 7 | 3 | 10 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 22 | 5 | 27 | 22 |
| General Electric | 115 | $ 2,200 | 12/65 | 410 | 590 | 1,000 | 260 |
| | 130 | $ 4,500 | 3/69 | 0 | 0 | 0 | 135 |
| | 205 | $ 2,900 | 6/64 | 14 | 0 | 14 | X |
| | 210 | $ 16,000 | 7/59 | 35 | 0 | 35 | X |
| | 215 | $ 6,000 | 9/63 | 20 | 3 | 23 | X |
| | 225 | $ 8,300 | 4/61 | 145 | 20 | 165 | X |
| | 235 | $ 12,500 | 4/64 | 113 | 23 | 136 | 18 |
| | 405 | $ 6,000 | 2/68 | 40 | 10 | 50 | 45 |
| | 415 | $ 11,000 | 5/64 | 338 | 112 | 450 | 35 |
| | 425 | $ 18,000 | 6/64 | 115 | 33 | 148 | 31 |
| | 435 | $ 25,000 | 9/65 | 31 | 9 | 40 | 15 |
| | 625 | $ 50,000 | 4/65 | 34 | 6 | 40 | 10 |
| | 635 | $ 60,000 | 5/65 | 51 | 6 | 57 | 24 |
| | 645 | $ 90,000 | 7/66 | 7 | 0 | 7 | 2 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 51 | 19 | 70 | 80 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 43 | 14 | 57 | 8 |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 16 | 2 | 18 | 2 |
| Hewlett-Packard | 200A | $ 2,500 | 11/68 | 0 | 0 | 0 | 68 |



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|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 74 | 2 | 76 | X |
| | DDP-116 | $ 900 | 4/65 | 203 | 43 | 246 | 17 |
| | DDP-124 | $ 2,050 | 3/66 | 55 | 17 | 72 | 18 |
| | DDP-224 | $ 3,300 | 3/65 | 48 | 10 | 58 | 2 |
| | DDP-516 | $ 700 | 9/66 | 133 | 47 | 180 | 128 |
| | H-110 | $ 2,500 | 9/68 | 12 | 0 | 12 | 105 |
| | H-120 | $ 4,000 | 1/66 | 770 | 190 | 960 | 95 |
| | H-125 | $ 5,000 | 12/67 | 53 | 10 | 63 | 105 |
| | H-200 | $ 8,600 | 3/64 | 821 | 344 | 1,165 | 100 |
| | H-400 | $ 8,500 | 12/61 | 53 | 37 | 90 | X |
| | H-632 | $ 3,500 | 11/68 | 0 | 0 | 0 | 44 |
| | H-800 | $ 28,000 | 12/60 | 59 | 14 | 73 | X |
| | H-1200 | $ 10,000 | 2/66 | 220 | 55 | 275 | 95 |
| | H-1250 | $ 12,000 | 8/68 | 9 | 1 | 10 | 50 |
| | H-1400 | $ 14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,000 | 1/66 | 116 | 24 | 140 | 78 |
| | H-4200 | $ 20,500 | 9/68 | 2 | 0 | 2 | 24 |
| | H-8200 | $ 50,000 | 12/68 | 0 | 0 | 0 | 10 |
| IBM | 305 | $ 3,600 | 12/57 | 65 | 25 | 90 | X |
| | 360/20 | $ 2,800 | 12/65 | 5,500 | 3,800 | 9,300 | 2,600 |
| | 360/25 | $ 5,330 | 1/69 | 0 | 0 | 0 | 2,500 |
| | 360/30 | $ 9,300 | 5/65 | 5,300 | 3,700 | 9,000 | 900 |
| | 360/40 | $ 19,500 | 4/65 | 2,900 | 1,100 | 4,000 | 520 |
| | 360/44 | $ 15,000 | 7/66 | 307 | 88 | 395 | 80 |
| | 360/50 | $ 33,000 | 8/65 | 1,040 | 270 | 1,310 | 770 |
| | 360/65 | $ 70,000 | 11/65 | 545 | 105 | 650 | 310 |
| | 360/67 | $138,000 | 6/66 | 37 | 9 | 46 | 35 |
| | 360/75 | $ 81,400 | 1/66 | 33 | 8 | 41 | 15 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 22 |
| | 360/90 Series | $150,000 | 11/67 | 7 | 0 | 7 | 12 |
| | 650 | $ 4,800 | 11/54 | 89 | 28 | 117 | X |
| | 1130 | $ 1,700 | 2/66 | 3,310 | 1,340 | 4,650 | 3,100 |
| | 1401 | $ 6,200 | 9/60 | 3,320 | 2,080 | 5,400 | X |
| | 1401-G | $ 2,300 | 5/64 | 660 | 640 | 1,300 | X |
| | 1401-H | $ 1,300 | 6/67 | 273 | 187 | 460 | 75 |
| | 1410 | $ 17,000 | 11/61 | 344 | 196 | 540 | X |
| | 1440 | $ 4,100 | 4/63 | 1,770 | 1,280 | 3,050 | 25 |
| | 1460 | $ 9,800 | 10/63 | 650 | 130 | 780 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 902 | 488 | 1,390 | X |
| | 1800 | $ 5,100 | 1/66 | 435 | 155 | 590 | 290 |
| | 7010 | $ 26,000 | 10/63 | 137 | 23 | 160 | X |
| | 702 | $ 6,900 | 2/55 | 4 | 0 | 4 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 19 | 2 | 21 | X |
| | 7040 | $ 25,000 | 6/63 | 58 | 44 | 102 | X |
| | 7044 | $ 36,500 | 6/63 | 89 | 32 | 121 | X |
| | 705 | $ 38,000 | 11/55 | 29 | 5 | 34 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 159 | 86 | 245 | X |
| | 7080 | $ 60,000 | 8/61 | 78 | 3 | 81 | X |
| | 709 | $ 40,000 | 8/58 | 3 | 0 | 3 | X |
| | 7090 | $ 63,500 | 11/59 | 30 | 6 | 36 | X |
| | 7094 | $ 75,500 | 9/62 | 95 | 3 | 98 | X |
| | 7094 II | $ 82,500 | 4/64 | 110 | 9 | 119 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 21 | 2 | 23 | X |
| | NCR-310 | $ 2,500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $ 8,700 | 5/62 | 530 | 275 | 805 | 35 |
| | NCR-315-RMC | $ 12,000 | 9/65 | 91 | 23 | 114 | 22 |
| | NCR-390 | $ 1,850 | 5/61 | 500 | 400 | 900 | X |
| | NCR-500 | $ 1,500 | 10/65 | 1,920 | 1,080 | 3,000 | 300 |
| | Century 100 | $ 2,645 | 9/68 | 40 | 0 | 40 | 780 |
| | Century 200 | $ 7,500 | 4/69 | 0 | 0 | 0 | 430 |
| Philco | 1000 | $ 7,010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $ 40,000 | 10/58 | 13 | 1 | 14 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,000 | 2/61 | 400 | 207 | 607 | X |
| | RCA 3301 | $ 18,000 | 7/64 | 75 | 10 | 85 | X |
| | RCA 501 | $ 14,000 | 6/59 | 78 | 2 | 80 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,100 | 9/65 | 149 | 65 | 214 | 65 |
| | Spectra 70/25 | $ 6,700 | 9/65 | 92 | 35 | 127 | 40 |
| | Spectra 70/35 | $ 8,000 | 1/67 | 133 | 57 | 190 | 140 |
| | Spectra 70/45 | $ 23,000 | 11/65 | 202 | 63 | 265 | 68 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 0 | 0 | 0 | 5 |
| | Spectra 70/55 | $ 33,300 | 11/66 | 13 | 2 | 15 | 16 |
| Raytheon | 250 | $ 1,200 | 12/60 | 123 | 49 | 172 | X |
| | 440 | $ 3,500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $ 3,200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp. | 650 | $ 500 | * 5/66 | 25 | 0 | 25 | 0 |
| | 655 | $ 1,800 | 10/66 | 68 | 0 | 68 | 11 |
| | 660 | $ 2,000 | 10/65 | 9 | 0 | 9 | 3 |
| | 670 | $ 2,600 | 5/66 | 1 | 0 | 1 | 0 |
| | 4700 | $ 800 | 2/69 | 0 | 0 | 0 | 4 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 127 | 6 | 133 | 2 |
| | SDS-910 | $ 2,000 | 8/62 | 208 | 15 | 223 | 2 |
| | SDS-920 | $ 2,900 | 9/62 | 184 | 8 | 192 | 4 |
| | SDS-925 | $ 3,000 | 12/64 | 58 | 2 | 60 | 4 |
| | SDS-930 | $ 3,400 | 6/64 | 222 | 25 | 247 | 7 |
| | SDS-940 | $ 18,000 | 4/66 | 34 | 0 | 34 | 20 |
| | SDS-9300 | $ 8,500 | 11/64 | 33 | 2 | 35 | 2 |
| | Sigma 2 | $ 1,800 | 12/66 | 122 | 18 | 140 | 165 |
| | Sigma 5 | $ 6,500 | 8/67 | 42 | 14 | 56 | 68 |
| | Sigma 7 | $ 12,000 | 12/66 | 36 | 11 | 47 | 22 |
| Standard Computer Corp. | IC6000 | $ 18,000 | 5/67 | 13 | 0 | 13 | 12 |
| | IC4000 | $ 10,000 | 9/68 | 1 | 0 | 1 | 2 |
| Systems Eng Labs | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810A/B | $900/$1,100 | 8/66;9/68 | 108 | 11 | 119 | 53 |
| | 840 | $ 1,400 | 11/65 | 4 | 0 | 4 | X |
| | 840A/MP | $1,400/$1,600 | 8/66;10/67 | 76 | 2 | 78 | 42 |
| UNIVAC | I & II | $ 25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $ 21,000 | 8/62 | 75 | 13 | 88 | X |
| | File Computers | $ 15,000 | 8/56 | 10 | 0 | 10 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 106 | 73 | 179 | X |
| | 418 | $ 11,000 | 6/63 | 105 | 53 | 158 | 17 |
| | 490 Series | $ 30,000 | 12/61 | 198 | 31 | 229 | 32 |
| | 1004 | $ 1,900 | 2/63 | 1,800 | 1,020 | 2,820 | 10 |
| | 1005 | $ 2,400 | 4/66 | 890 | 410 | 1,300 | 65 |
| | 1050 | $ 8,500 | 9/63 | 187 | 86 | 273 | 5 |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1107 | $ 57,000 | 10/62 | 19 | 8 | 27 | X |
| | 1108 | $ 68,000 | 9/65 | 101 | 37 | 138 | 105 |
| | 9200 | $ 1,500 | 6/67 | 270 | 80 | 350 | 625 |
| | 9300 | $ 3,400 | 9/67 | 136 | 44 | 180 | 480 |
| | 9400 | $ 7,000 | 5/69 | 0 | 0 | 0 | 115 |
| | LARC | $135,000 | 5/60 | 2 | 0 | 2 | X |
| | | | TOTALS | 47,735 | 22,924 | 70,659 | 17,602 |

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.



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November 18 - November 29, 1968

| | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 998 | 83 1/2 | 79 3/4 | 82 | - 1 | - 1.20 |
| American R & D | 207 | 122 1/2 | 446 | 190 | 162 | 189 | +26 | +15.95 |
| Ampex Corp. | 39 1/8 | 26 1/2 | 3312 | 39 1/8 | 35 7/8 | 38 1/2 | + 2 1/8 | + 5.84 |
| Bunker Ramo | 21 3/8 | 15 | 5031 | 17 5/8 | 16 | 17 1/4 | - 1/8 | - 0.72 |
| Burroughs | 255 3/4 | 157 | 854 | 255 3/4 | 234 1/2 | 253 1/4 | +21 1/4 | + 9.16 |
| Collins Radio | 101 1/8 | 53 | 1383 | 71 3/8 | 63 1/2 | 70 3/8 | + 3 7/8 | + 5.83 |
| Control Data | 160 | 124 1/4 | 2404 | 160 | 139 3/4 | 157 7/8 | +16 1/8 | +11.38 |
| Electronic Assoc. | 27 3/8 | 18 | 976 | 25 1/8 | 23 5/8 | 23 5/8 | + 3/8 | + 1.56 |
| General Electric | 100 3/8 | 80 1/4 | 2599 | 100 3/8 | 95 3/4 | 99 5/8 | + 2 7/8 | + 2.97 |
| Honeywell | 139 3/4 | 89 3/8 | 579 | 127 7/8 | 119 1/4 | 127 3/4 | + 8 5/8 | + 7.24 |
| IBM | 375 | 304 1/2 | 2092 | 334 3/4 | 318 1/2 | 333 3/4 | + 6 3/4 | + 2.06 |
| ITT | 62 | 44 7/8 | 2418 | 62 | 59 1/2 | 61 3/4 | + 1 3/4 | + 2.92 |
| Litton | 104 3/4 | 62 | 2811 | 82 3/4 | 75 1/8 | 79 5/8 | - 2 3/8 | - 2.90 |
| Memorex | 93 1/2 | 61 1/2 | 1686 | 86 3/4 | 80 1/8 | 86 | + 4 1/4 | + 5.20 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 1164 | 129 | 117 1/4 | 129 | + 7 1/4 | + 5.95 |
| RCA | 55 | 44 1/4 | 3296 | 49 3/8 | 46 7/8 | 48 7/8 | + 1 3/8 | + 2.89 |
| Raytheon | 54 | 33 1/4 | 1499 | 50 1/4 | 46 1/2 | 49 5/8 | + 1 | + 2.06 |
| Sanders | 66 1/2 | 41 3/4 | 1573 | 63 3/4 | 58 1/2 | 60 1/8 | - 1 3/8 | - 2.24 |
| Scientific Data | 117 1/2 | 79 3/4 | 1542 | 102 3/4 | 87 3/4 | 101 3/4 | +11 3/4 | +13.06 |
| SCM | 61 1/4 | 35 3/4 | 5404 | 48 3/4 | 40 3/8 | 48 1/4 | + 8 1/2 | +20.86 |
| Singer | 88 7/8 | 62 3/4 | 1224 | 88 | 82 3/4 | 87 7/8 | + 1 7/8 | + 2.18 |
| Sperry Rand | 63 3/8 | 41 3/8 | 3413 | 50 1/2 | 44 5/8 | 50 1/4 | + 4 1/2 | + 9.84 |
| Teledyne | 143 7/8 | 90 1/8 | 3730 | 122 1/2 | 97 1/4 | 122 1/2 | + 4 3/4 | + 4.85 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 5.66 | + 5.43 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 70 1/2 | 42 | 479 | 70 1/2 | 65 1/4 | 70 1/4 | + 5 3/8 | + 8.28 |
| Cal. Comp. | 53 1/4 | 26 3/4 | 677 | 39 5/8 | 37 3/4 | 38 | - 3/4 | - 1.94 |
| Clary Corp. | 32 3/8 | 12 1/4 | 769 | 23 1/2 | 20 3/8 | 22 7/8 | + 2 1/8 | +10.24 |
| Computer Applications | 42 5/8 | 17 5/8 | 352 | 22 3/8 | 20 1/8 | 20 5/8 | - 5/8 | - 2.94 |
| Computer Sciences | 64 3/4 | 31 5/8 | 996 | 61 7/8 | 57 3/4 | 60 1/2 | + 1 1/8 | + 1.89 |
| Computing & Software | 84 1/4 | 43 1/2 | 102 | 83 | 77 | 80 1/4 | - 3/4 | - 0.93 |
| Data Proc. Fin. & Gen. | 69 5/8 | 46 1/2 | 2078 | 69 5/8 | 60 1/4 | 65 | + 5 3/8 | + 9.01 |
| Data Products | 23 | 17 1/8 | 2433 | 23 | 17 1/8 | 21 5/8 | + 3 5/8 | +20.14 |
| Digital Equipment | 165 | 95 1/4 | 232 | 165 | 148 1/4 | 164 | +14 1/2 | + 9.70 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 644 | 34 | 29 | 33 7/8 | + 4 1/2 | +15.32 |
| Granite Computer Leasing | 58 7/8 | 42 5/8 | 255 | 44 7/8 | 42 5/8 | 43 3/4 | + 1/4 | + 0.58 |
| Greyhound Computer | 43 1/4 | 25 | 946 | 31 1/4 | 26 1/4 | 29 | + 2 3/4 | +10.48 |
| Leasco | 139 3/4 | 70 3/4 | 1680 | 139 3/4 | 129 1/2 | 139 3/4 | +13 3/4 | +10.91 |
| Levin-Townsend Comp. Corp. | 67 3/4 | 47 5/8 | 1860 | 59 7/8 | 55 3/4 | 56 7/8 | + 1/4 | + 0.44 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 826 | 28 | 23 5/8 | 24 1/2 | - 2 1/2 | - 9.26 |
| Mohawk Data Sciences | 107 1/2 | 58 | 2033 | 80 | 70 | 76 | + 6 1/2 | + 9.35 |
| Planning Research | 61 3/4 | 28 | 354 | 61 3/4 | 59 | 61 1/4 | + 1 3/4 | + 2.94 |
| Potter Instrument | 38 1/2 | 20 1/2 | 444 | 33 7/8 | 30 1/8 | 31 1/2 | - 1 3/8 | - 4.18 |
| Randolph Computers | 64 | 34 5/8 | 1178 | 44 7/8 | 41 1/2 | 43 3/8 | + 1 5/8 | + 3.89 |
| Systems Eng. Labs. | 42 5/8 | 26 5/8 | 1068 | 34 7/8 | 29 1/2 | 34 3/8 | + 5 | +17.02 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 3.43 | + 5.81 |

| | 1968 High Bid | 1968 Low Bid | November 29 Bid | November 29 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 | 14 1/2 | 35 | 36 | 36 | - 1 | - 2.77 |
| Aries Corp. | 24 | 12 1/2 | 15 1/2 | 16 1/4 | 14 3/4 | + 3/4 | + 5.08 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 15 3/4 | 16 1/2 | 14 3/4 | + 1 | + 6.77 |
| Computer Usage | 62 | 28 1/2 | 33 1/2 | 35 | 37 1/2 | - 4 | -10.67 |
| Cyber-tronics | 19 | 10 1/2 | 13 1/8 | 13 5/8 | 12 3/8 | + 3/4 | + 6.06 |
| Digitronics | 27 1/2 | 16 1/2 | 19 3/4 | 20 3/4 | 22 1/2 | + 2 3/4 | +12.22 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 14 1/2 | 15 | 14 3/4 | - 1/4 | - 1.69 |
| Electronic Memories | 57 1/2 | 32 3/4 | 57 1/2 | 59 | 51 1/4 | + 6 1/4 | +12.20 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 13 3/4 | 14 1/4 | 12 3/8 | + 1 3/8 | +11.11 |
| Informatics, Inc. | 68 | 32 | 66 1/2 | ** | 65 | + 1 1/2 | + 2.31 |
| LMC Data, Inc. | 16 | 7 | 7 3/4 | 8 1/4 | 8 1/4 | - 1/2 | - 6.06 |
| Management Assistance | 16 3/4 | 9 1/4 | 14 1/2 | 14 7/8 | 14 | + 1/2 | + 3.57 |
| Optical Scanning Corp. | 145 | 71 | 129 | 133 | 126 | + 3 | + 2.38 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 84 | 85 1/2 | 79 | + 5 | + 6.33 |
| Standard Computers | 55 | 30 | 47 | 49 | 44 | + 3 | + 6.82 |
| Tally Corp. | 51 1/2 | 33 | 35 | 37 | 40 | - 5 | -12.50 |
| TBS Computer Centers Corp. | 21 3/4 | 11 1/4 | 12 | 12 3/4 | 11 3/4 | + 1/4 | + 2.13 |
| University Computing | 185 | 57 | 173 | 178 | 182 | - 9 | - 4.95 |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 9,1969 ● VOL.4,NO.10 P.J.McGOVERN,EDITOR

## POINTS OF LAW TAKE ON INCREASING IMPORTANCE AS LEGAL ACTION AGAINST IBM CONTINUES

*Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal.*

-- Section 1, Sherman Antitrust Act

*Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by fine not exceeding fifty thousand dollars, or by imprisonment not exceeding one year, or by both said punishments, in the discretion of the court.* -- Section 2, Sherman Antitrust Act

*(a) It shall be unlawful for any person engaged in commerce . . . to discriminate in price between different purchasers of commodities of like grade and quality . . . where the effect of such discrimination may be substantially to lessen competition or tend to create a monopoly . . .*

*(e) It shall be unlawful for any person to discriminate in favor of one purchaser against another purchaser or purchasers . . . by contracting to furnish or furnishing . . . or offering for sale of such commodity so purchased upon terms not accorded to all purchasers on proportionally equal terms.*

-- Section 2, Clayton Antitrust Act as amended by Robinson-Patman Act

*It shall be unlawful for any person engaged in commerce . . . to lease or make a sale or contract for sale of goods . . . or fix a price charged therefor, or discount from, or rebate upon, such price, on the condition, agreement, or understanding that the lessee or purchaser thereof shall not use or deal in the goods . . . of a competitor . . . where the effect of such . . . may be to substantially lessen competition or tend to create a monopoly in any line of commerce.*

-- Section 3, Clayton Antitrust Act

The above excerpts from Title 15 of the United States Code are from the principal laws under which Control Data brought suit against IBM a few weeks ago (EDP/IR, Dec.23,1968), under which Data Processing Financial & General Corp. last week sued IBM. and under which the Justice Department filed its complaint against IBM in 1952 . . . in an action that resulted in theConsent Decree of 1956. These will also, in all likelihood, be the basis of an antitrust complaint that many people expect to be filed momentarily by Justice against IBM.

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Nature of the newest suit

In the second big suit against IBM -- brought on Jan. 3 -- DPF&G "prays" that the industry giant be broken into four separate parts, claims damages of $351.5 million, and asks treble this amount plus $1 billion in punitive damages . . . a total of over $2 billion. In its suit, on the other hand, CDC was less specific and asked only for "treble the amount of its actual damages," and for relief "including dissolution of the business or divesture of properties" of IBM.

The complaints differ . . . in style, in charges, and in apparent intent. While CDC appears to be primarily trying to protect its position in marketing the recently announced 7600 supercomputer (EDP/IR, Dec. 5, 1968), DPF&G, in a sense, seems to be attempting to obtain legal redress for circumstances inherent in the third-party computer leasing business because of the way the industry has developed.

Most of DPF&G's complaint deals with IBM's policy of offering "packages" of hardware, software, service, training, and maintenance; the rest is primarily composed of allegations about the differential treatment accorded IBM to rental customers, machine owners, and "subsequent users." One unusual part of the DPF&G complaint is the definition of "software." The definition is different from any that EDP/IR has seen, and almost seems to be used as a convenience. Semantics, however, is the name of one of the games in the computer industry.

> Software -- All of the following categories of goods and services which under varying circumstances may be used in conjunction with electronic data processing equipment -- (i) basic operations programs; (ii) applications programs; (iii) systems engineering services; and (iv) educational services.

Twenty pages of DPF&G's 38-page complaint expound on the six broad charges summarized in the complaint as follows:

> Continuously from in or about the year 1954 to the date of the filing of this complaint IBM has violated Section 2 of the Sherman Antitrust Act by attempting to monopolize and by monopolizing the manufacture and distribution of electronic data processing equipment and the furnishing of software and maintenance to users of such equipment as follows:
>
> (a) IBM has utilized its monopoly of the manufacture and distribution of electronic data processing equipment to attempt to monopolize and to monopolize the furnishing of software.
>
> (b) IBM has utilized its monopoly of the manufacture and distribution of electronic data processing equipment to attempt to monopolize and to monopolize the market for maintenance of electronic data processing equipment.
>
> (c) IBM has attempted to monopolize and has monopolized the manufacture and distribution of electronic data processing equipment by treating its rental customers more favorably than purchase customers, thereby discriminating against purchasers of such equipment.
>
> (d) IBM has utilized its monopoly of maintenance of electronic data processing equipment to attempt to monopolize and to monopolize the manufacture and distribution of electronic data processing equipment.



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(e) IBM has utilized its monopoly of software to attempt to monopolize and to monopolize the manufacture and distribution of electronic data processing equipment.

(f) IBM has attempted to monopolize and has monopolized the distribution of electronic data processing equipment by establishing and maintaining policies and engaging in acts and practices deliberately designed to eliminate electronic data processing equipment leasing companies as competitors, to confine such companies to a drastically limited share of the market for the distribution of such equipment, and otherwise to prevent free and open competition with IBM by such leasing companies in the distribution of such equipment.

The other counts, which comprise most of the rest of DPF&G's complaint, are summarized by the additional summary paragraph:

> The aforesaid attempts to monopolize, monopolization and the acts, contracts, agreements and understandings which formed and continue to form a part thereof and were and are being used in effectuation thereof, in violation of Sections 1 and 2 of the Sherman Antitrust Act, Section 3 of the Clayton Antitrust Act and Section 2 of the Clayton Antitrust Act as amended by the Robinson-Patman Act, are hereinafter more fully set forth and described. IBM threatens to continue and will continue the offenses herein alleged unless the relief hereinafter prayed for is granted.

After the specific allegations under these acts are listed, DPF&G claims to be a "third party beneficiary" under the Consent Decree of 1956, and claims that IBM has "breached its agreements" and obligations under the Consent Decree." It then lists the consent decree's orders to IBM about (1) sales-to-lease ratios; (2) establishing nondiscriminatory terms for sale, including reasonable credit; (3) establishing salesmen compensation plans that are not less favorable to sale than to rental; (4) making full disclosure of prices for sale and lease; (5) offering equal services, other than maintenance, to purchasers and lessees; (6) offering maintenance at nondiscriminatory prices; (7) selling, at reasonable and nondiscriminatory prices, replacement and repair parts.

IBM's position

The same day the suit was filed, IBM issued a response to the announcement of the suit, saying that it had not seen the formal complaint. After seeing the complaint, IBM did not change the statement, except to remove the reference to not seeing the complaint. The statement starts out by saying that the conditions to which DPF&G objects were in effect at the time that it went into business in 1961. "Furthermore," it continues, "they have been the basis of the relationships between IBM and all of its customers for many years and have been well known." The statement continues as follows:

> Since DPF&G went into business, IBM has made several changes advantageous to the growing number of leasing companies. Mr. Goodman has publicly applauded a number of these changes.
>
> Last May IBM made available without charge IBM classroom education, programming systems maintenance, and installation planning assistance for users of leasing company-owned equipment which is relocated and reapplied.



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In October, after IBM had announced adjustments in its maintenance prices and some leasing companies reported that the adjustments would work a hardship on them because of fixed price contractual agreements with their customers, IBM withdrew them.

In mid-1967, IBM -- which has long helped finance computer leasing companies through its installment payment plan -- lifted its limitation on the dollar amount of debt for an individual customer. Since that time, the installment loan debt to IBM of leasing companies has more than tripled.

Most recently, on December 6, 1968, IBM announced that by no later than July 1, 1969, it expects to make changes in the way it charges for and supports its data processing equipment, which is apparently DPF&G's current principal complaint. The changes are aimed at determining what support services should be separately offered and priced to better meet the future requirements of all users of IBM equipment.

IBM considers DPF&G's allegations to be completely without merit and denies that it has violated the antitrust laws. IBM said it intends to defend the suit vigorously in the courts.

DPF&G's comment

Shortly after the lawsuit was announced, DPF&G sent to the press a completely unmarked document that looked and read, for all intents and purposes, exactly like a news story, although it covered only one side of the issue. It does give some comments from the company, and we quote a portion of it:

When reached for comment, Harvey Goodman, President of DPF&G, stated: "This lawsuit has been in preparation for nearly a year. During that time, we have on numerous occasions discussed our grievances with IBM in an attempt to resolve them without litigation. Our principal aim has been and still is to establish free and open competition in all areas of the computer industry. We believe that IBM recognizes that major changes in its methods of doing business are necessary to achieve this aim, but we are no longer willing to accept the vague promises and foot-dragging which have characterized IBM's past responses to our complaints." Mr. Goodman added: "We have also participated in numerous discussions on this matter with other members of the Computer Lessors Association, and they welcome the present action as not only timely, but necessary."

Mr. Goodman also noted that the DPF&G action is "quite different from the one recently filed against IBM by Control Data." He explained that, although both complaints are based generally upon IBM's monopolization of the computer industry, "most of the specific practices which we, as users, are protesting are not really central to an action instituted by a competing manufacturer, such as Control Data."

When questioned about the damage figure of $351,500,000 (which when trebled by provision of the anti-trust laws totals $1,054,500,000), Mr. Goodman emphasized that, "DPF&G is prepared to justify that figure." He said that, "the Company has carefully analyzed all of the markets and all of the opportunities that IBM has illegally deprived us of" and that the damage figure alleged is quite realistic.



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Mr. Goodman also stated: "Our Company's significant and rapid growth in the face of IBM's illegal practices is obviously no legal justification for these practices. Although the Company has been highly successful, we strongly feel that IBM has intentionally prevented computer companies from reaching maximum profit potential with illegal policies and practices that cannot be countenanced by a court of law."

Analysis and prognosis

In reporting DPF&G's suit against IBM, as in covering the complaint filed by Control Data, EDP/IR has quoted at some length from the documents involved. In this way, we believe, the reader can better understand the nature of the situation. The facts involved are complex, and several lawyers to whom we have talked can say only that they will be interested in following the progress of the cases.

Antitrust law is quite complex: Almost every case is different and the rules keep changing; the major cases are filed by the U.S. Government; many cases occur before an industry reaches its maturity, and therefore the courts sometimes play an important role in shaping the structure of major industries. And while every industry is different, the computer industry is unique.

From an interesting phenomenon just ten years ago, the computer industry has grown to one of the most important in the country. During the last decade, according to figures recently released by the Commerce Department, U.S. manufacturing as a whole grew 65% . . . the computer industry (including punched card equipment and adding machines) grew by 511%, highest of any. And one reason for this dramatic growth is that the industry was protected by the umbrella of one large company.

IBM, early, grasped the potential of computers, and with aggressive marketing techniques virtually built the industry. Other companies could possibly have done it . . . indeed one -- Univac -- was originally in a much better position to do it than was IBM. But IBM did it. And now, because one company decided to develop and sell a technology and lead the resulting industry in its ten years of almost 20%-a-year growth, companies that benefited by this development are attacking one of the forces that allowed it in the first place.

EDP/IR is not exonerating IBM; we are not saying it is entirely innocent of the charges raised by CDC and DPF&G. Indeed, many of the specifications relate to actions or representations that must have been made, at one time or another, by some IBMers. Documents such as these complaints, based on extensive legal and research efforts, cannot be created out of blue sky. Neither can a company like IBM, with over 200,000 employees, entirely control employee actions on a real-time basis.

On the other hand, EDP/IR believes that these cases -- and additional ones filed by other companies in the industry or by the Attorney General -- must be examined quite carefully in the whole light of the economic situation. Where there have been specific grievances, justice should be done. No company, certainly not the industry's giant, as EDP/IR so often describes IBM, should be allowed to violate the law. But no company, in our opinion, should be allowed -- or should wish -- to disrupt an industry for the fulfillment of a personal vendetta.

Two complaints are filed, and each may contain some valid charges. EDP/IR is examining the complaints item by item, and in upcoming issues will comment on those that, upon investigation, seem to have merit . . . and on those that seem completely unjustified. We do not intend to be judge or jury. We do hope, however, that both judge and jury, if they are necessary, will examine the whole cloth.



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## NEW REGISTRATIONS BY COMPUTER COMPANIES

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| APPLIED LOGIC CORPORATION | Applied Logic Corporation, One Palmer Square, Princeton, New Jersey, a service bureau offering time-sharing, batch-processing and software services, on Dec. 24 filed 218,000 common, 200,000 of which are offered by the company. The proceeds, at a price to be set by amendment (max. $30 per share), will be used for equipment and for software development. The underwriter will be F. S. Mosley & Co., 50 Congress St., Boston. |
| COMPUTER SHARING, INC. | Computer Sharing, Inc., One Bala Ave. Bldg., Bala-Cynwd, Pa., a time-sharing service bureau, on Dec. 13, filed 410,000 common. The proceeds, at a price of $10 per share, will be used for debt repayment, equipment, and working capital. The underwriter will be Suplee, Mosley, Close & Kerner, Inc., 1500 Walnut St., Philadelphia, Pa. |
| CONTINENTAL COMPUTER ASSOCIATES, INC. | Continental Computer Associates, Inc., Cedarbrook Mall, Pa., a computer leasing company, on Dec. 17, filed $15,000,000 of convertible junior subordinated debentures due 1989. The proceeds, at a price of 100% and with an interest rate to be determined by amendment, will be used for debt repayment, equipment, and working capital. The underwriter will be Bear, Stearns & Co., One Wall St., New York. |
| CYBERNETICS INTERNATIONAL CORP. | Cybernetics International Corp., 277 Park Ave., New York, which provides computer related services, on Dec. 13, filed 385,000 common, 200,000 are offered by their present holders and 185,000 by the company. The proceeds of the company's offering, at a price to be set by amendment (max. $15), will be used for the development and marketing of software systems and time-sharing systems. The underwriter will be Sutro & Co., 460 Montgomery St., San Francisco. |
| DPA, INC. | DPA, Inc., 1955 Merrick Road, Merrick, New York, a computer leasing company, on Nov. 14, filed $15,000,000 of senior subordinated cov. debentures. The proceeds, at a price to be set by amendment, will be used for purchasing computer equipment and for working capital. The underwriters will be H. L. Federman & Co., 50 Broadway, New York and Allen & Co., 30 Broad St., New York. |
| ENNIS BRANDON COMPUTER SERVICES, INC. | Ennis Brandon Computer Services, Inc., 214 West Knox St., Ennis, Texas, which proposes to provide EDP service to small businesses, on Dec. 6, filed 150,000 common. The proceeds, at a price of $5 per share, will be used for development of software packages and for general working capital. The underwriters will be Eppler Guerin & Turner, Inc., 3900 First National Bank Bldg., Dallas. |



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| | |
|---|---|
| GSI COMPUTER INC. | GSI Computer, Inc., Commerce Park, Danbury, Conn., a computer leasing company, on Nov. 14, filed 1,000,000 common. The proceeds, at a price to be set by amendment (max. $30 per share), will be used for debt repayment, financing a time-sharing center and graphic communication centers. The underwriter will be S. D. Fuller, Inc., 26 Broadway, New York. |
| GENERAL COMPUTER SYSTEMS, INC. | General Computer Systems, Inc., 12810 Coit Road, Dallas, Texas, which proposes to manufacture and market a Data/Tape System, on Dec. 11, filed 150,000 common to be offered on a "best efforts" basis. The proceeds, at a price of $4 per share, will be used for the design and construction of pilot and prototype systems and for working capital. The underwriter will be Monarch Funding Corp., 79 Wall St., New York. |
| HEURISTIC CONCEPTS, INC. | Heuristic Concepts, Inc., 2836 Third Ave., Bronx, N.Y., which provides various training, systems analysis, and consulting services in the EDP field, on Dec. 15, filed 200,000 common on a "best efforts" basis. The proceeds at a price of $5 per share, will be used for opening EDP schools, for program development, for executive recruitment and for other corporate purposes. The underwriter will be Willard Securities, Inc., 445 Park Ave., N.Y. |
| INFORMATION INTERNATIONAL, INC. | Information International, Inc., 545 Technology Square, Cambridge, Mass., which develops, assembles and markets a variety of computer-based electronic-optical systems, on Nov. 26, filed 250,000 and 125,000 warrants to be offered in units of two shares and one warrant. The proceeds, at a price to be set by amendment ($61 per unit max.), will be used for the development of OCR equipment and for working capital. The underwriter will be Putman, Coffin, & Burr-Doolittle, Inc., 26 Broadway, N.Y. |
| PROGRAMMING AND SYSTEMS, INC. | Programming and Systems, Inc., 151 West St., N.Y., a diversified data processing organization, on Nov. 26, filed 200,000 common and $5,000,000 of 4 1/2% conv. subordinated debentures due 1989, to be offered on a "best efforts, all or none" basis. The proceeds, at prices to be set by amendment, will be used to purchase an unspecified number of shares from a former vice-president and for general corporate purposes. The underwriter will be Austin, James & Co., Inc., 15 Williams St., N.Y. |
| SSI COMPUTER CORP. | SSI Computer Corp., 1 Bush St., San Francisco, Cal., a computer leasing company, on Dec. 18, filed 105,000 common, an unspecified number of warrants and $15,000,000 of subordinated debentures due 1989. The number of warrants, interest rate on the debentures and offering price of the stock (max. $38) are to be supplied by amendment. The proceeds will be used for equipment acquisition. The underwriters will be Glore Forgan, Wm. R. Staats, Inc., 221 Montgomery St., San Francisco, Cal. |
| VIATRON COMPUTER SYSTEMS CORPORATION | Viatron Computer Systems Corporation, 105 Terrace Hall Ave., Burlington, Mass., which proposes to manufacture a low cost data entry system, on Dec. 27, filed 800,000 common. The price of the shares will be set by amendment. The underwriter will be Shields & Co., Inc., 44 Wall St., New York. |



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| | 1968 High | 1968 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 1432 | 82 | 75 1/8 | 75 7/8 | - 6 1/8 | - 7.47 |
| American R & D | 207 | 122 1/2 | 276 | 192 1/2 | 183 1/2 | 191 1/4 | + 2 1/4 | + 1.19 |
| Ampex Corp. | 42 1/8 | 26 1/2 | 2760 | 42 1/8 | 38 3/8 | 41 7/8 | + 3 3/8 | + 8.76 |
| Bunker Ramo | 21 3/8 | 15 | 6016 | 17 3/4 | 16 | 17 1/8 | - 1/8 | - 0.70 |
| Burroughs | 255 3/4 | 157 | 539 | 253 1/4 | 239 5/8 | 239 3/4 | -13 1/2 | - 5.33 |
| Collins Radio | 101 1/8 | 53 | 1248 | 73 1/4 | 67 | 72 1/4 | + 1 7/8 | + 2.66 |
| Computer Sciences | 67 3/8 | 41 1/2 | 1063 | 67 3/8 | 60 1/8 | 61 | + 1/2 | + 0.83 |
| Control Data | 163 1/2 | 124 1/4 | 2568 | 163 1/2 | 149 5/8 | 150 | + 7 7/8 | + 4.98 |
| Electronic Assoc. | 27 3/8 | 18 | 937 | 25 1/4 | 22 1/2 | 24 3/4 | + 1 1/8 | + 4.76 |
| General Electric | 100 3/8 | 80 1/4 | 2544 | 99 3/4 | 93 1/4 | 96 1/2 | - 3 1/8 | - 3.14 |
| Honeywell | 139 3/4 | 89 3/8 | 598 | 126 3/4 | 117 1/2 | 118 1/2 | - 9 1/4 | - 7.24 |
| IBM | 375 | 304 1/2 | 1663 | 334 3/4 | 316 1/2 | 316 1/2 | -17 1/4 | - 5.17 |
| ITT | 62 1/2 | 44 7/8 | 1913 | 62 1/2 | 61 | 62 | + 1/4 | + 0.40 |
| Litton | 104 3/4 | 62 | 2315 | 81 1/4 | 75 3/8 | 76 1/4 | - 3 3/8 | - 4.24 |
| Memorex | 93 1/2 | 61 1/2 | 829 | 91 7/8 | 82 1/2 | 83 5/8 | - 2 3/8 | - 2.76 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 774 | 130 1/2 | 123 | 126 1/2 | - 2 1/2 | - 1.94 |
| RCA | 55 | 44 1/4 | 4304 | 49 3/8 | 47 1/8 | 48 1/4 | - 5/8 | - 1.28 |
| Raytheon | 54 | 33 1/4 | 1586 | 50 1/2 | 48 1/2 | 49 7/8 | + 1/4 | + 0.50 |
| Sanders | 66 1/2 | 41 3/4 | 1156 | 60 3/4 | 55 1/4 | 59 3/4 | - 3/8 | - 0.62 |
| Scientific Data | 117 1/2 | 79 3/4 | 940 | 102 3/8 | 96 3/8 | 97 | - 4 3/4 | - 4.67 |
| SCM | 61 1/4 | 35 3/4 | 3037 | 48 3/4 | 45 3/4 | 45 7/8 | - 2 3/8 | - 4.92 |
| Singer | 88 7/8 | 62 3/4 | 1074 | 88 3/8 | 83 3/4 | 85 1/4 | - 2 5/8 | - 2.99 |
| Sperry Rand | 63 3/8 | 41 3/8 | 3832 | 51 3/4 | 49 1/2 | 49 5/8 | - 5/8 | - 1.24 |
| Teledyne | 143 7/8 | 86 1/4 | 1707 | 122 | 112 1/2 | 114 3/8 | - 8 1/8 | - 6.63 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 2.48 | - 1.51 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 75 1/2 | 42 | 255 | 75 1/2 | 70 1/4 | 73 1/2 | + 3 1/4 | + 4.63 |
| Cal. Comp. | 53 1/4 | 26 3/4 | 1065 | 39 3/8 | 37 5/8 | 38 3/8 | + 3/8 | + 0.99 |
| Clary Corp. | 32 3/8 | 12 1/4 | 1403 | 26 3/8 | 21 7/8 | 25 5/8 | + 2 3/4 | +12.02 |
| Computer Applications | 42 5/8 | 17 5/8 | 497 | 23 3/8 | 20 1/4 | 21 7/8 | + 1 1/4 | + 6.06 |
| Computing and Software | 84 1/4 | 43 1/2 | 164 | 82 1/4 | 79 | 82 | + 1 3/4 | + 2.18 |
| Data Proc. Fin. & Gen.* | 72 1/2 | 46 1/2 | 2931 | 72 1/2 | 62 1/4 | 65 7/8 | + 7/8 | + 1.35 |
| Data Products | 23 | 17 1/8 | 1465 | 22 1/8 | 19 1/8 | 21 3/4 | + 1/8 | + 0.57 |
| Digital Equipment | 179 | 95 1/4 | 246 | 179 | 162 1/4 | 177 | +13 | + 7.93 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 287 | 35 1/2 | 31 1/2 | 32 1/2 | - 1 3/8 | - 4.06 |
| Granite Computer | 58 7/8 | 42 1/2 | 245 | 45 1/4 | 42 1/2 | 43 | - 3/4 | - 1.71 |
| Greyhound Computer | 43 1/4 | 25 | 895 | 30 | 27 1/8 | 29 1/2 | + 1/2 | + 1.72 |
| Leasco | 143 | 70 3/4 | 1228 | 143 | 130 5/8 | 130 3/4 | - 9 | - 6.88 |
| Levin-Townsend Comp. | 67 3/4 | 47 5/8 | 1949 | 57 3/8 | 52 1/8 | 53 5/8 | - 3 1/4 | - 5.71 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 1184 | 29 5/8 | 22 7/8 | 28 1/2 | + 4 | +14.04 |
| Mohawk Data Sciences | 107 1/2 | 58 | 4130 | 79 | 70 | 71 3/8 | - 4 5/8 | - 6.09 |
| Planning Research | 63 1/4 | 28 | 401 | 61 1/4 | 58 3/4 | 61 1/4 | -- | -- |
| Potter Instrument | 38 1/2 | 20 1/2 | 422 | 32 | 30 | 30 | - 1 1/2 | - 4.76 |
| Randolph Computers | 64 | 34 5/8 | 975 | 44 | 40 5/8 | 41 1/8 | - 2 1/4 | - 5.19 |
| Systems Eng. Labs. | 42 5/8 | 26 5/8 | 580 | 35 1/2 | 30 | 30 1/8 | - 4 1/4 | -12.36 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 0.05 | + 0.03 |

* Stock split

| | 1968 High Bid | 1968 Low Bid | December 13 Bid | December 13 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 | 14 1/2 | 34 | 36 | 35 | - 1 | - 2.86 |
| Aries Corp. | 24 | 12 1/2 | 15 3/4 | 16 1/2 | 15 1/2 | + 1/4 | + 1.61 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 17 1/4 | 18 1/4 | 15 3/4 | + 1 1/2 | + 9.52 |
| Computer Usage | 62 | 28 1/2 | 43 1/2 | 45 1/2 | 33 1/2 | +10 | + 2.99 |
| Cyber-tronics | 19 | 10 1/2 | 12 3/4 | 13 1/4 | 13 1/8 | - 3/8 | - 2.86 |
| Digitronics | 27 1/2 | 16 1/2 | 23 | 24 | 19 3/4 | + 4 1/4 | +21.52 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 14 3/8 | 14 7/8 | 14 1/2 | - 1/8 | - 0.86 |
| Electronic Memories | 67 | 32 3/4 | 67 | 69 | 57 1/2 | + 9 1/2 | +16.52 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 14 1/8 | 14 5/8 | 13 3/4 | + 3/8 | + 2.73 |
| Informatics, Inc. | 68 | 32 | 66 | ** | 66 1/2 | - 1/2 | - 0.75 |
| LMC Data, Inc. | 16 | 7 | 8 1/4 | 9 | 7 3/4 | - 1/2 | - 6.45 |
| Management Assistance | 16 3/4 | 9 1/4 | 14 1/2 | 14 7/8 | 14 1/2 | -- | -- |
| Optical Scanning Corp. | 145 | 71 | 136 | 140 | 129 | + 7 | + 5.43 |
| Recognition Equipment Inc. | 101 | 38 1/2 | 79 | 81 | 84 | - 5 | - 5.95 |
| Standard Computers | 55 | 30 | 42 1/2 | 44 1/2 | 47 | - 4 1/2 | - 9.57 |
| Tally Corp. | 51 1/2 | 33 | 35 | 37 | 35 | -- | -- |
| TBS Computer Centers Corp. | 21 3/4 | 10 1/2 | 11 | 11 3/4 | 12 | - 1 | - 8.33 |
| University Computing | 185 | 57 | 168 | 172 | 173 | - 5 | - 2.89 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 28, 1969 • VOL.4,NO.11 P.J.McGOVERN,EDITOR

It happened!

## JUSTICE FILES ITS ANTITRUST SUIT AGAINST IBM

It was expected in some quarters . . . held to be a remote possibility in others. It is considered, variously, as a slap at the free enterprise system . . . an overdue action . . . and perhaps the best thing that could happen to IBM in the light of legal action already taken (EDP/IR Dec.23,1968 & Jan.9,1969). In any event, it has happened:

The Justice Department has filed its antitrust against IBM. And IBM, obviously prepared, countered quickly:

- Within an hour or two of the filing -- late on the last Friday of the outgoing Johnson administration -- IBM issued a press release which said it will "defend itself forcefully against this action, which it believes is unwarranted and without foundation."

- In a letter to stockholders dated Jan. 17, IBM Chairman Thomas J. Watson, Jr. repeated much of what was said in the press release (quoted later in this issue) and assured stockholders "the highly competitive data processing industry will remain a growing and dynamic one, and that the fundamental outlook for IBM's future continues to be very good."

- In double-page, center-fold spreads in the New York Times, the Wall Street Journal, and major metropolitan dailies, IBM on Wednesday, Jan. 22 asked: "Has IBM spoiled the computer business for others? Let's look at the record . . ." The text which followed was a well-thought-out, convincing explanation of IBM's role and posture in the computer industry.

In its complaint, Justice is asking, as a minimum, for separate pricing of "(a) general purpose digital computers; (b) peripheral equipment; (c) computer software; and (d) other customer support which it manufactures or offers to its customers." Also, Justice asked the court for "provisions barring IBM from setting prices that fail to reflect reasonable returns and from granting special allowances that unreasonably inhibit the entry or growth of competitors." In addition, of course, Justice asked the court to declare that IBM "has attempted to, and did monopolize . . . the general purpose digital computer industry" and, therefore, "to order any divorcement, divestiture or reorganization of IBM deemed necessary to dissipate the effects of the allegedly illegal activities and to restore competitive conditions."

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Some of these requests, it is sure, will be effected voluntarily or legally; and any change in IBM's way of doing business will have an effect on the computer industry. In this issue, therefore, EDP/IR presents a rundown on the Justice Dept. complaint; the statement issued almost immediately by IBM; and an examination of the situation as it now appears to stand.

The Justice Department Complaint

Unlike the complaints filed recently by Control Data and Data Processing Financial & General, which were brought under various sections of both the Sherman and the Clayton Acts (EDP/IR, Jan.9,1969), the complaint filed by the Justice Dept. in the Southern District of New York is instituted only, "to prevent and restrain the continuing violation of" Section 2 of the Sherman Act. This antitrust law involves "every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons to monopolize . . ." It is used less often than other antitrust legislation.

In its complaint, Justice describes the defendant, IBM, defines terms in a very general manner, outlines previous antitrust action against IBM, then, about half way through its 12 pages, describes IBM's alleged offenses, the effects of these, and what is requested from the court. We quote from this stage to the end of the complaint:

OFFENSES

19. Beginning in or about 1961 and continuing up to and including the date of the filing of this complaint, the defendant has attempted to monopolize and has monopolized the aforesaid interstate trade and commerce in general purpose digital computers in violation of Section 2 of the Sherman Act (15 U.S.C. §2). Said offenses are continuing and will continue unless the relief hereinafter prayed for is granted.

20. Pursuant to and in furtherance of the aforesaid attempt to monopolize and the monopolization, the defendant has pursued a manufacturing and marketing policy that has prevented competing manufacturers of general purpose digital computers from having an adequate opportunity effectively to compete for business in the general purpose digital computer market, and has done, among other acts, the following:

(a) Maintained a pricing policy whereby it quotes a single price for hardware, software and related support and, thereunder, (i) discriminated among customers by providing certain customers with extensive software and related support in a manner that unreasonably inhibited the entry or growth of competitors; and (ii) limited the development and scope of activities of an independent software and computer support industry as a result of which the ability of its competitors to compete effectively was unreasonably impaired;

(b) Used its accumulated software and related support to preclude its competitors from effectively competing for various customer accounts;

(c) Restrained and attempted to restrain competitors from entering or remaining in the general purpose digital computer market by introducing selected computers, with unusually low profit expectations, in those segments of the market where competitors had or appeared likely to have



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unusual competitive success, and by announcing future production of new models for such markets when it knew that it was unlikely to be able to complete production within the announced time; and

(d) Dominated the educational market for general purpose digital computers, which was of unusual importance to the growth of competitors both by reason of this market's substantiality and by reason of its ultimate impact on the purchasing decisions in the commercial market, by granting exceptional discriminatory allowances in favor of universities and other educational institutions.

EFFECTS

21. The aforesaid offenses have had, among other things, the following effects:

(a) The defendant has monopolized and continues to monopolize the general purpose digital computer market in the United States;

(b) Actual and potential competition in the manufacture and marketing of general purpose digital computers in the United States has been restrained; and

(c) Competitors of IBM have been improperly deprived of the opportunity to earn competitive profits on their general purpose digital computers and actual and potential competitors have been discouraged from entering or continuing in the business of manufacturing and marketing general purpose digital computers.

PRAYER

WHEREFORE, the plaintiff prays:

1. That the Court adjudge and decree that the defendant has attempted to, and did monopolize interstate trade and commerce in the general purpose digital computer industry in violation of Section 2 of the Sherman Act.

2. That the defendant and all persons, firms, and corporations acting in its behalf or under its direction or control be permanently enjoined from engaging in, carrying out, or renewing any contracts, agreements, practices, or understandings, or claiming any rights thereunder, having the purpose or effect of continuing, reviving, or renewing the aforesaid violation of the Sherman Act, or any contract, agreement, combination or conspiracy having like or similar purpose or effect.

3. That the defendant hereafter be required to price separately and to offer to sell or lease separately, and to sell or lease separately to any applicant upon such terms and conditions as the Court may direct (a) general purpose digital computers; (b) peripheral equipment; (c) computer software; and (d) other customer support which it manufactures or offers to its customers.

4. That the defendant hereinafter be required to refrain from the use of special allowances, buy-backs of computer time, or research grants, in the sale or lease of any and all general purpose digital computers, periph-



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eral equipment, computer software and other customer support equipment or services which it manufactures or offers to any of its customers, where the effect of such practices may be unreasonably to inhibit the entry or growth of competitors.

5. That the defendant hereinafter be required to refrain from entering into the production of computer hardware which is not likely to result in returns reasonably related to returns from other computer hardware products sold or leased, or which could be sold or leased, by the defendant.

6. That the defendant hereinafter be required to refrain from the announcement of the development or production of any planned computer hardware or software until such product has been subjected to normal testing.

7. That the plaintiff have such relief by way of divorcement, divestiture and reorganization with respect to the business and properties of the defendant as the Court may consider necessary or appropriate to dissipate the effects of the defendant's unlawful activities as hereinbefore alleged in this complaint, and to restore competitive conditions to the general purpose digital computer industry.

8. That the plaintiff have such other and further relief as the nature of the case may require and the Court may deem proper in the premises.

9. That the plaintiff recover the costs of this suit.

The IBM reply

Within an hour or so after Justice filed the complaint, IBM was ready with its answer. It was given by telephone to publications about to close, and was mailed across the board on Jan. 17, the Friday of the filing. Here is exactly what it said:

ARMONK, N.Y., Jan. 17 . . . International Business Machines Corporation said today it will defend itself forcefully against charges by the Department of Justice that it is monopolizing the data processing industry. IBM said it believes the government's action to be unwarranted and without foundation.

The company's statement said:

This lawsuit is the outgrowth of the previously reported discussions which have been going on for nearly three years between the Department of Justice and various companies in the data processing industry. IBM has cooperated fully in this review.

One of the key issues in these discussions has been whether there is sufficient competition in the data processing industry or whether IBM has such monopolistic power that fully effective competition does not exist.

Evidence of the open and strongly competitive nature of the computer business is abundant. Virtually nonexistent 20 years ago, it has grown into a multi-billion-dollar industry that has attracted more than 60 manufacturers of computer systems and some 4,000 companies dealing in related equipment, support, and services.



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New companies as well as major and well-established ones have been freely and effectively entering the industry, whether they have a competence in electronics, a background in business machines, or simply a technical innovation which can be developed into a business. Technological advances have come at a very rapid rate, and from all corners -- not just from IBM.

Despite this evidence of strong and increasing competition, the Government has decided to bring this suit.

IBM will defend itself forcefully against this action, which it believes is unwarranted and without foundation. The company believes, furthermore, that the highly competitive data processing industry will remain a growing and dynamic one.

And IBM continued spreading its story in newspaper advertisements. Quickly after the Justice suit was filed, IBM ran double-truck spreads -- estimated to have cost IBM, for space alone, well over $500,000 -- in virtually all of the country's standard-sized metropolitan dailies. In the all-print ad, IBM admits that loose talk of its dominant role in the computer industry would be dangerous -- "if the charges were true." It then gives its side . . . and asks the reader to look at the "facts," including a classical discussion of monopoly:

> Some hang their charges of "monopoly power" on what they call IBM's excessive share of the market. That market share is substantial; it is the product of IBM's emphasis on excellence in all the years it has been in the business. It is the product of customer response to the investments we have made, and to the quality of our people, our products, our service.
>
> But monopoly power is not a numbers game based merely on what has occurred in a market in the past. Rather, common characteristics of monopoly, as the economists define it, exist when newcomers are unable to break into an industry, when competition is suppressed, when innovation is throttled, when there is no price competition, when the interests of the customer are subordinated to those who monopolize the industry.
>
> These are hardly the characteristics of the computer industry that is alleged to be a "monopoly" of IBM. But let the facts of the industry speak for themselves. They tell it better than we could.

IBM continued, then, to tell it well. The 1500-or-so-word text was lucid and well organized. It was definitely written to counter the charges of monopoly stemming from some of the recent lawsuits, although many of its overtones reflect the continuing series of advertisements in which IBM talks to the public and to the general business community about the important role that the computer business plays in the economy and about the helpful role that IBM plays within the computer industry (EDP/IR,June 14,1968).

Although IBM won't say whether or not the ad was prepared prior to the Justice Department's filing of its complaint, there is every likelihood that it was in the works, at least. Just the physical job of seeting the ad in type, making mats, reserving double-page spreads, and delivering the mats to 100-plus newspapers requires an intensive amount of effort and coordination . . . and a frenzied weekend: The complaint was filed late one Friday, the ad broke the next Wednesday.



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Was the ad a one-shot affair? IBM won't say, but advertising executives at other computer companies point out the importance of repeat exposure . . . especially when selling a concept. If IBM's goal is to inform the public and create good will among customers and stockholders, then it is almost a certainty that similar ads will appear with regularity. And this must be at least one reason for the ad. In any event, the ad shows the importance of the situation, at least to IBM, and illustrates that IBM indeed intends to defend itself forcefully.

Separate pricing

It seems quite apparent, now -- in the light of everything that has happened in the last month or so -- that some form of "unbundling," or separate pricing, will be instituted by IBM. IBM announced its intention in this direction, before the first suit had been filed, and summarized its position in its reply to the complaint filed by DPF&G:

> Most recently, on December 6, 1968, IBM announced that by no later than July 1, 1969, it expects to make changes in the way it charges for and supports its data processing equipment, which is apparently DPF&G's current principal complaint. The changes are aimed at determining what support services should be separately offered and priced to better meet the future requirements of all users of IBM equipment.

EDP/IR considered this prospect quite carefully last year (EDP/IR,May 15,1968), and has rethought the situation seriously again following the bringing of the matter to the courts. We see no need to change the position and analysis stated in the referenced issue:

> Proponents of separate pricing admit that it will take IBM action to make it work, and yet such action might simultaneously make competitive survival more difficult for other computer manufacturers, force independent software suppliers to offer more service at reduced profit margina, and put many computer users in a position of having to pay more for less. [Emphasis added.]

In addition, as we pointed out in the same newsletter, separate pricing will work to the advantage of IBM . . . its effect on other portions of the computer industry are not known.

Thus, separate pricing is going to be here to one degree or another. Yet, some companies are beginning to see the total picture. One software company has already "urged" that Justice "proceed with deliberate caution in its antitrust action against IBM to avoid disrupting the stability of the 'relatively young and still highly volative data processing industry.'" And many computer manufacturers admit, privately, that separate pricing might work to their disadvantage unless IBM's software operation continued to hold its price umbrella.

We must reaffirm the position taken in the issue mentioned above, in which we analyzed separate pricing: "[Separate pricing] would definitely be a disadvantage to most manufacturers; and, over the long term, it would probably hurt all the above [independent software suppliers and many users] and work to the advantage of only one organization -- IBM." This may not be completely clear at first glance, but we are convinced that the computer industry is unique . . . operating at a level much higher than would be possible were it not for the pattern and policies established by the dominant company in the industry.



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Third-party computer leasing

This situation shows up nowhere more clearly than it does with the companies which essentially buy computers from IBM and lease them to users at a rate lower than IBM's rental charges . . . assuming, perhaps correctly, that the lifetime of today's computer is more than the four years which IBM chooses to use as its write-off period.

In following this business practice, the leasing companies, really, are making a profit at a financial game which IBM was specifically barred from continuing under the Consent Decree of 1956: Leasing companies only "rent" computers, and in their operations they use marketing practices and accounting techniques that, if carried out on a mass scale by one company, would bring the wrath of Justice down on them.

Leasing has developed into a substantial element in the computer industry -- primarily because IBM prefers to rent its computers. Today, about 10% of the computers in this country are on third-party lease, and EDP/IR estimates that about 15% of the computers shipped during 1968 were for third-party lease. And a recent survey conducted by the International Data Corp., which publishes EDP/IR, indicates that about half the executives in the companies surveyed are going to consider third-party leasing in future computer acquisitions.

Such an outlook for leasing, of course, preassumes a status quo within the computer marketplace. With the institution of full separate pricing, it could turn out that the price differential between leasing and renting the basic hardware would be insignificant . . . with software, training, and maintenance priced separately and probably higher than in today's "packages."

Analysis and prognosis

The filing of the Justice Dept. complaint may well be an important milestone in the history of the computer industry. Even though separate pricing was probably on the way, it will be termed an outgrowth of the complaint. Other shifts by IBM -- many of which were also on the back burner -- will definitely be considered reactions by IBM and part of the suspected behind-the-scene maneuvering by the parties involved.

What happens -- be it a new consent decree, a withdrawal of the suit after sufficient voluntary actions by IBM, or a court decision -- is most important to the future of the computer industry. It will shape the structure of the industry for many years to come.

EDP/IR considers the computer industry, which will soon be the world's largest, is unique. We certainly hope that in the process of resolving the legal issues that have been raised that the responsible parties take a careful look into the highly involved economics of the industry. Competition is certainly to be desired; equally desirable, however, is continued growth. We repeat our hope that the industry is not disrupted merely for the sake of striking out against the company that led it to its present healthy level.

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The day before Justice filed its complaint, IBM announced its preliminary results for 1968. Earnings were up 33.8% to $871.5 million on gross income of $6.9 billion, up 28.9%. The company noted, however, that the growth of income from sales and rentals, up "only 15.4%," was a "better measure" of IBM's basic progress.



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December 16, 1968 - January 3, 1969

| | 1968 High | 1968 Low | 3 week Sales in 100's | 3 week High | 3 week Low | Last | 3 week Net Change | 3 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 2426 | 76 3/8 | 68 3/4 | 70 5/8 | - 5 1/4 | - 6.91 |
| American R & D | 207 | 122 1/2 | 225 | 192 1/2 | 176 1/4 | 179 3/8 | -11 7/8 | - 6.20 |
| Ampex Corp. | 42 3/8 | 26 1/2 | 2210 | 42 3/8 | 37 7/8 | 38 7/8 | - 3 | - 7.16 |
| Bunker Ramo | 21 3/8 | 15 | 10289 | 18 1/4 | 16 1/4 | 16 7/8 | - 1/4 | - 1.46 |
| Burroughs | 255 3/4 | 157 | 760 | 234 1/2 | 234 7/8 | 236 1/2 | - 3 1/4 | - 1.36 |
| Collins Radio | 101 1/8 | 53 | 869 | 74 7/8 | 67 1/4 | 68 5/8 | - 3 5/8 | - 5.02 |
| Computer Sciences | 67 3/8 | 41 1/2 | 1048 | 61 3/8 | 54 | 54 7/8 | - 6 1/8 | -10.04 |
| Control Data | 163 1/2 | 124 1/4 | 3403 | 151 7/8 | 142 3/8 | 142 3/8 | - 7 5/8 | - 5.08 |
| Electronic Assoc. | 27 3/8 | 18 | 1287 | 24 3/4 | 21 3/8 | 22 7/8 | - 1 7/8 | - 7.58 |
| General Electric | 100 3/8 | 80 1/4 | 3070 | 97 7/8 | 93 | 95 3/4 | - 3/4 | - 7.72 |
| Honeywell | 139 3/4 | 89 3/8 | 1216 | 119 7/8 | 111 1/4 | 113 | - 5 1/2 | - 4.64 |
| IBM | 375 | 304 1/2 | 3079 | 329 1/2 | 309 1/4 | 312 | - 4 1/2 | - 1.42 |
| ITT | 62 1/2 | 44 7/8 | 3901 | 61 7/8 | 55 1/8 | 56 1/4 | - 5 3/4 | - 9.27 |
| Litton | 104 3/4 | 62 | 3506 | 77 | 71 1/2 | 73 3/4 | - 2 1/2 | - 3.28 |
| Memorex | 93 1/2 | 61 1/2 | 1068 | 87 7/8 | 78 1/4 | 78 1/4 | - 5 3/8 | - 6.62 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 990 | 127 3/4 | 114 5/8 | 117 | - 8 1/2 | - 6.72 |
| RCA | 55 | 44 1/4 | 5085 | 48 1/2 | 45 5/8 | 47 1/2 | - 3/4 | - 1.55 |
| Raytheon | 54 | 33 1/4 | 2546 | 51 3/4 | 48 1/4 | 48 1/4 | - 1 5/8 | - 3.27 |
| Sanders | 66 1/2 | 41 3/4 | 1391 | 62 | 57 7/8 | 60 1/4 | + 1/2 | + 0.84 |
| Scientific Data | 117 1/2 | 79 3/4 | 1347 | 99 | 91 1/4 | 93 1/2 | - 3 1/2 | - 3.61 |
| SCM | 61 1/4 | 35 3/4 | 3476 | 46 7/8 | 42 1/2 | 45 | - 7/8 | - 1.91 |
| Singer | 88 7/8 | 62 3/4 | 840 | 85 3/4 | 78 1/2 | 78 3/4 | - 6 1/2 | - 7.62 |
| Sperry Rand | 63 3/8 | 41 3/8 | 5057 | 50 1/8 | 46 1/8 | 49 1/4 | - 3/8 | - 0.76 |
| Teledyne | 143 7/8 | 90 1/8 | 1932 | 116 | 105 1/4 | 107 7/8 | - 6 1/2 | - 5.68 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 4.02 | - 4.63 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic DP | 75 1/2 | 42 | 246 | 74 1/4 | 66 7/8 | 66 7/8 | - 6 5/8 | - 9.01 |
| Calcomp | 53 1/4 | 26 3/4 | 894 | 37 3/4 | 35 3/8 | 36 5/8 | - 1 3/4 | - 4.56 |
| Clary Corp. | 32 3/8 | 12 1/4 | 753 | 25 7/8 | 23 | 24 3/8 | - 1 1/4 | - 4.88 |
| Computer Applications | 42 5/8 | 17 5/8 | 857 | 22 1/4 | 19 1/8 | 21 1/4 | - 5/8 | - 2.86 |
| Computing and Software | 85 | 43 1/2 | 202 | 85 | 79 | 79 | - 3 | - 3.70 |
| Data Proc. Fin. & Gen. | 72 1/2 | 46 1/2 | 1961 | 66 3/4 | 57 1/2 | 57 3/4 | - 8 1/8 | -12.33 |
| Data Products | 28 7/8 | 17 1/8 | 5175 | 28 7/8 | 21 | 25 1/2 | + 3 3/4 | +17.24 |
| Digital Equipment | 179 | 95 1/4 | 187 | 178 | 171 1/4 | 173 | - 4 | - 2.31 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 307 | 33 1/8 | 29 5/8 | 31 5/8 | - 7/8 | - 2.67 |
| Granite Computer | 58 7/8 | 41 1/2 | 657 | 46 3/4 | 41 1/2 | 41 1/2 | - 1 1/2 | - 3.49 |
| Greyhound Computer | 43 1/4 | 25 | 1262 | 30 | 25 7/8 | 28 5/8 | - 7/8 | - 2.97 |
| Leasco | 143 | 70 3/4 | 1488 | 135 | 120 1/2 | 125 1/4 | - 5 1/2 | - 4.21 |
| Levin-Townsend Comp. | 67 3/4 | 47 5/8 | 2214 | 57 1/8 | 52 1/2 | 56 5/8 | + 3 | + 5.59 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 1719 | 33 | 24 1/8 | 31 3/4 | + 3 1/4 | +11.40 |
| Mohawk Data Sciences | 107 1/2 | 58 | 2222 | 73 3/8 | 66 | 68 5/8 | - 2 3/4 | - 3.85 |
| Planning Research | 63 1/4 | 28 | 575 | 62 1/4 | 59 5/8 | 59 5/8 | - 5/8 | - 1.02 |
| Potter Instrument | 38 1/2 | 20 1/2 | 634 | 31 3/8 | 28 1/8 | 30 | -- | -- |
| Randolph Computers | 64 | 34 5/8 | 1468 | 43 | 39 1/2 | 40 3/8 | - 3/4 | - 1.82 |
| Systems Eng. Labs. | 42 5/8 | 26 5/8 | 773 | 31 1/2 | 27 3/4 | 29 | - 1 1/8 | - 3.73 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 1.54 | - 1.90 |

| | 1968 High Bid | 1968 Low Bid | January 3 Bid | January 3 Asked | 3 weeks ago Bid | 3 week net change Bid | 3 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 | 14 1/2 | 34 1/2 | 36 1/2 | 34 | + 1/2 | + 1.47 |
| Aries Corp. | 24 | 12 1/2 | 17 1/2 | 19 | 15 3/4 | + 1 3/4 | +11.11 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 18 1/4 | 19 1/4 | 17 1/4 | + 1 | + 5.80 |
| Computer Usage | 62 | 28 1/2 | 38 | 40 | 43 1/2 | - 5 1/2 | -12.64 |
| Cyber-tronics | 19 | 10 1/2 | 12 1/8 | 12 5/8 | 12 3/4 | - 5/8 | - 4.90 |
| Digitronics | 27 1/2 | 16 1/2 | 22 1/2 | 23 1/2 | 23 | - 1/2 | - 2.17 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 15 1/2 | 16 | 14 3/8 | - 1 1/8 | - 7.83 |
| Electronic Memories | 67 | 32 3/4 | 56 | 58 | 67 | -11 | -16.42 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 12 5/8 | 13 1/8 | 14 1/8 | - 1 1/2 | -10.62 |
| Informatics, Inc. | 34 | 16 | 27 | ** | 33 | - 6 | -18.18 |
| LMC Data, Inc. | 16 | 7 | 7 1/4 | 8 | 8 1/4 | - 1 | -12.12 |
| Management Assistance | 16 3/4 | 9 1/4 | 14 7/8 | 15 1/4 | 14 1/2 | + 3/8 | + 2.59 |
| Optical Scanning Corp. | 145 | 71 | 118 | 122 | 136 | -18 | -13.23 |
| Recognition Equipment, Inc. | 101 | 38 1/2 | 76 | 78 | 79 | - 3 | - 3.80 |
| Standard Computers | 55 | 30 | 44 1/2 | 46 1/2 | 42 1/2 | + 2 | + 4.71 |
| Tally Corp. | 51 1/2 | 37 | 34 1/2 | 36 1/2 | 35 | - 1/2 | - 1.43 |
| TBS Computer Centers Corp. | 21 3/4 | 10 1/2 | 13 1/2 | 14 1/4 | 11 | + 2 1/2 | +22.73 |
| University Computing | 185 | 57 | 155 | 158 | 168 | -13 | - 7.74 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" FEBRUARY 19,1969 • VOL.4,NO.12 P.J.McGOVERN,EDITOR

## FLURRY OF ACTIVITY BY "TIME-SHARING" ORGANIZATIONS BEGINS TO ESTABLISH PATTERNS UNDER WHICH "RAIR" COMPUTING WILL GROW

In the space of only about one year, time sharing has progressed from still being a very minor portion of the computer service business -- little more than a plaything to many users -- to a position of very measurable size. A little more than half the $180 million estimated to be spent for Rair computing (Remote Access/ Immediate Response -- see EDP/IR Aug.9,1968) will be for time sharing; new companies continue to be formed; and during the last month or so several significant announcements have been made.

Indeed, the gist of these announcements seems to spell out quite well the general pattern under which Rair computing will grow. Here are some of the new time-sharing twists or developments that have entered the picture:

- General Electric has implemented a major pricing reorganization that lowers the cost for "raw" computer power and charges the user for the application packages that he actually uses. In a separate move, GE reorganized its "on-line computer services business" by, essentially, setting up one group to generate computer power and another group to develop and market the services that use this computer power.

- Honeywell, apparently having decided that the time has come to start going after some of the on-line computing business opportunities, has announced a time-sharing computer through its Computer Control Div. and has set up a time-sharing service operation as part of a new Information Services Division.

- Service Bureau Corp. has added the PL/1 language to the call-up computing service operation that was shifted to it from IBM last fall (EDP/IR Oct.30,1968). Also, SBC salesmen have beefed up quotas and are aggressively selling services -- with Teletypes and other terminals not manufactured by IBM available when desired.

- Control Data has announced what it calls "the first national computer network" in which more than 25 cities are linked up to a number of computers -- including six of its largescale 6600s.

- Computer Sciences Corp., getting ready for its time-sharing system built around some 20 Univac 1108s, has formed an Information Network Div., which will establish regional computer centers beginning this year. And Univac itself has completed its own coast-to-coast 1108 network by opening its west coast center.

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The flurry of activity illustrated by these examples is important. It certainly seems to indicate that time-sharing and other types of Rair computing will grow at least as fast as previously predicted. Even more important is the clear indication that this field will likely be dominated by major companies with large information networks. Already the business is being concentrated among the large companies, and the outlook for most small companies isn't good.

Economics of time sharing

Late last fall Auerbach Corp. published a special time-sharing study that was sponsored by organizations that paid in the neighborhood of $8,000 each. One finding, which is substantiated by studies conducted by EDP/IR, is that "the leading competitive force" in commercial time sharing is General Electric, with a 40% share of the current market in the U.S.

In second place is Service Bureau Corp., with 19%. Ranked next, the report says, are four independents -- Call-A-Computer, Com-Share, Tymshare, and Allen-Babcock -- with market shares ranging from 7% down to 3%. Thirty or so smaller companies shared the remainder of what Auerbach predicted was a $70 million market last year.

That the market for time sharing has grown to this level in only four years, the report states, is "ample testimony that it has been well received in the marketplace." This certainly is true. But acceptance in the marketplace does not make the service profitable for suppliers. Consider the typical user as characterized in the Auerbach report:

- Between two and three Teletype terminals are used for commercial time sharing.
- Each terminal is used approximately two hours daily.
- The monthly time-sharing expenditure per terminal is approximately $600, excluding communications costs.

A very basic calculation shows the difficulty of a service making money at this level of activity: A computer that rents for $24,000 would require a monthly operations cost of about $72,000. With each user spending about $600 per month, it would take 120 users to reach this break-even level. Computers in this rental range can typically handle 30 to 40 simultaneous users, so profitibility is theoretically possible . . . but not highly likely with only one computer.

The Auerbach report seems to acknowledge this. "Despite the rapid pace at which new services are being formed and despite the fact that very few services have yet become profitable," the report says, it believes "the long-term market potential of commercial time sharing is more than adequate to support judicious new business ventures."

Among things that will help "maximize the chances of financial success in the face of intensive competition" are included: a program of software system development, a carefully planned marketing program with strong emphasis on customer training and support, ample financial backing to adequately support the initial development.

These items definitely are important. Already there have been several exam-



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ples of companies that have had to go out for additional funds; software packages and customer support are clearly becoming more important; there are definite indications that price competition is the order of the day.

Moves by major manufacturers

In the recent announcements by major manufacturers, there is clear evidence of variable pricing with emphasis on applications. GE, for example, has reduced the basic charge for its connect time from $10.00 an hour to $7.50, and it has eliminated a direct charge for central processor time. Instead, it has adopted a computer resource unit (CRU), a variable charge based on such things as amount of CP time used, types of languages or applications used, and the amount of memory required for a task.

Honeywell, in its new time-sharing service already operating at two locations and set to be added in major cities across the country, will take much the same approach. Already, connect time varies between $5.00 and $10.00 an hour, depending on the total number of hours used each month. And, a spokesman says, as more applications are developed by the software portion of the new division, the company will likely adopt an approach similar to GE's. And Control Data, providing access to 6600s over its Cybernet, has many variable charges in a scheme designed to bill the customer only for the portions of the system he uses.

This variable pricing, it seems to EDP/IR, is certainly good for the user. But far more important, we think, is its potential for the operator of an on-line computer service center. With this technique, the problem of protecting proprietary software is vastly reduced. If a customer can access a proprietary package only via an on-line network, the owner of the package is protected and reimbursed according to usage.

Information networks

There seems to be no question but that computer usage, in the near future, will primarily be on line. Whether it is time sharing, on-line batch processing, remote job entry, data file look-up, or what, a large number of computer applications will be implemented via communications links. Indeed, by the early 1970s about three-fourths of this country's computers will have terminals attached.

Most of the large time-sharing or Rair operations are developing networks. GE, in addition to already serving users over networks which radiate out from its time-sharing centers, is planning a nationwide hookup between several of its large 600 series computers.

And Control Data recently announced and demonstrated a nationwide system called Cybernet -- a system of terminals, medium-scale computers, and supercomputers all linked together via a Telpack network. This arrangement provides back-up and load-sharing to customers. Also, it makes available to users of the entire system programs that perhaps are implemented only at one of the computer sites. ITT, Univac, and virtually every large on-line computing operation is talking about and working toward the same type of system.

And the network concept is not restricted to the large companies. Time Share Corp., which is setting up networks of time-sharing users based on the Hewlett-Packard computer, has one system in operation and a second planned. Eventually, these individual little networks, offering computation and other services at only



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a few dollars an hour, will most likely be tied in with a large central computer to provide bursts of power when it's needed. In a similar manner, Strategic Systems Inc., through its time-sharing subsidiary, is setting up a spider-web-like network of PDP-8s to offer time sharing and proprietary software. Thus, be it the major manufacturer or the new entry, the pattern of operation seems clear.

## FIRST DELIVERIES OF CENTURY 100 COMPUTERS INDICATE PERFORMANCE AS PROMISED

It was almost a year ago when the National Cash Register Co. "unveiled" its Century series of computers -- machines that had been anticipated for two prior years under the 615 designation. (EDP/IR Mar. 13, 1968) And late this fall -- after putting some 44 Century 100s into its own sites for customer support, NCR started delivering its "transition generation" computers to customers.

The initial customer deliveries were about a month behind schedule because there were strikes at NCR's OEM plants. But NCR started to deliver Centurys to customers during the last month of 1968. And its planning apparently paid off: For a year and a half, NCR had worked with its new machine, trying to avoid the software problems that have plagued most new systems introduced in recent years. EDP/IR interviewed the data processing managers who received the first commercial machines, and their comments speak well for the trouble-free operation which NCR had counted on:

- The computers are "running beautifully;" they were in operation within a day or two after delivery, and have not been down.

- The initial installations have had a little peripheral trouble -- a paper tape reader at one and printers at two others -- but there have been no major problems with the systems or the software.

- All of the new installations are using NEAT/3, a programming language developed by NCR, and are pleased with its "ease of programming and its flexibility."

- There was speculation that NCR could never implement its idea of giving support from its test centers around the country. But managers of the new machines say that they "couldn't imagine better support."

- Application packages are being developed slowly, to be sure. But the installation that is using an application package is quite happy with it.

If these first installations are any indication, NCR seems to have made a go with its transition generation entry into the computer race. Orders are so piled up that the company already is accelerating production to meet demand: According to EDP/IR's estimate, almost 1300 Century computers are on order. But the stakes for NCR are high. It says that it has already invested $150 million in developing and introducing the Centruy, and its goal is to deliver 5,000 systems -- roughly $1 billion in sales value.

First shipments of the second member of the Century family -- the 200 -- are planned for spring and said to be on schedule. Also, this year, NCR should announce a larger machine specifically tailored for time sharing, although the company points out all models have on-line, real-time capabilities. There is no reason to believe that through its careful entry into today's marketplace NCR can't make a good little niche for itself -- a billion dollar niche.



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## NEW REGISTRATIONS BY COMPUTER COMPANIES

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

**ADVANCED SYSTEMS, INC.**

Advanced Systems, Inc., 1100 West Northwest Highway, Mount Prospect, Ill. which provides training in computer operations, on Dec. 30 filed 150,000 common. The proceeds, at a price of $5 per share, will be used to open more education centers, for debt repayment, and for software development. The underwriter will be Pressman, Frohlich & Frost, Inc., 140 Broadway, N.Y.

**COMMUNITY COMPUTER CORP.**

Community Computer Corp., 185 W. School House Lane, Philadelphia, Pa., which offers time sharing and other computer services, on Jan. 23 filed 150,000 Class A stock. The proceeds, at a price of $3.75 per share, will be used for debt repayment, working capital and equipment. The underwriter will be Herbert Young & Co., Inc., 160 Broadway, N.Y.

**COMPUTERS UNLIMITED, INC.**

Computers Unlimited, Inc., 318 Executive Office Bldg., Rochester, N.Y., which proposes to offer various computer services, on Jan. 14 filed 350,000 common. The proceeds, at a price of $5 per share, will be used for establishment of a time-sharing center and for marketing expenses. The underwriter will be the First Monroe Corp., 17 Clinton Ave. South, Rochester, N.Y.

**DIGITAL INFORMATION DEVICES, INC.**

Digital Information Devices, Inc., 306 West Logan St., Norristown, Pa., which has developed a data input preparation device (the "Data Transcriber"), on Jan. 16 filed 300,000 common. The proceeds, at a price to be set by amendment ($15 per share max.), will be used for starting-up the manufacturing and sales of the device. The underwriter will be Dempsey-Tegler & Co., 1000 Locust St., St. Louis, Mo.

**DIGITAL TECHNOLOGY CORP.**

Digital Technology Corp., Crest Rd., Huntington Bay, L.I., N.Y. which proposes to engage in the development, manufacture and sale of electronic computer compatible equipment, on Jan. 27 filed 200,000 common. The proceeds, at a price of $4 per share, will be used for working capital, and for development, manufacture and sale of its equipment. The underwriter will be Dunhill Securities Corp., 21 West St., N.Y.

**INTERNATIONAL TELECOMPUTER NETWORK CORP.**

International Telecomputer Network Corp., 4919 Fairmount Ave., Bethesda, Md., a service bureau, on Jan. 27 filed 185,000 common. The proceeds, at a price to be set by amendment ($12 per share max.), will be used for computer rentals, advertising and salaries. The underwriter will be S.R.H. Securities, 55 Broad St.,N.Y.

**L & H COMPUTER CORP.**

L & H Computer Corp., 7501 South Pulaski Rd., Chicago, Ill., which designs and develops computer application packages, on Dec. 31 filed 200,000 common. The proceeds, at a price of $5 per share, will be used for staff and equipment acquisition. The underwriter will be Charles Plohn & Co., 200 Park Ave., N.Y.



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF DECEMBER 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 23 | 3 | 26 | X |
| | 220 | $ 14,000 | 10/58 | 25 | 2 | 27 | X |
| | B100 | $ 2,800 | 8/64 | 138 | 22 | 160 | 2 |
| | B200 Series | $ 5,400 | 11/61 | 452 | 83 | 535 | 5 |
| | B300 Series | $ 9,000 | 7/65 | 443 | 97 | 540 | 85 |
| | B500 | $ 3,800 | 11/68 | 3 | 0 | 3 | 115 |
| | B2500 | $ 5,000 | 2/67 | 79 | 16 | 95 | 105 |
| | B3500 | $ 14,000 | 5/67 | 91 | 20 | 111 | 219 |
| | B5500 | $ 25,000 | 3/63 | 81 | 8 | 89 | 5 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 65 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 18 |
| | B8500 | $200,000 | 12/68 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 272 | 12 | 284 | X |
| | G-20 | $ 15,500 | 4/61 | 17 | 2 | 19 | X |
| | LGP-21 | $ 725 | 12/62 | 145 | 3 | 148 | X |
| | LGP-30 | $ 1,300 | 9/56 | 103 | 5 | 108 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 48 | 4 | 52 | X |
| | 160*/160A/160C | $2,100/$5,000/$12,000 | 5/60;7/61/3/64 | 463 | 39 | 502 | X |
| | 924/924A | $ 11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 48 | 3 | 51 | X |
| | 1700 | $ 3,800 | 5/66 | 138 | 59 | 197 | 95 |
| | 3100/3150 | $ 10,000 | 12/64 | 105 | 23 | 128 | 20 |
| | 3200 | $ 14,000 | 5/64 | 46 | 16 | 62 | X |
| | 3300 | $ 20,000 | 9/65 | 111 | 29 | 140 | 22 |
| | 3400 | $ 18,000 | 11/64 | 15 | 4 | 19 | X |
| | 3500 | $ 25,000 | 1/69 | 0 | 0 | 0 | 24 |
| | 3600 | $ 52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $ 53,000 | 2/66 | 19 | 3 | 22 | 2 |
| | 6400/6500 | $ 56,000 | 5/66 | 49 | 17 | 66 | 28 |
| | 6600 | $115,000 | 8/64 | 44 | 13 | 57 | 17 |
| | 7600 | $235,000 | 1/69 | 0 | 0 | 0 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 52 | 2 | 54 | X |
| | PDP-4 | $ 1,700 | 8/62 | 44 | 4 | 48 | X |
| | PDP-5 | $ 900 | 9/63 | 94 | 10 | 104 | X |
| | PDP-6 | $ 10,000 | 10/64 | 14 | 5 | 19 | X |
| | PDP-7 | $ 1,300 | 11/64 | 132 | 38 | 170 | X |
| | PDP-8 | $ 525 | 4/65 | 1100 | 250 | 1350 | 25 |
| | PDP-9 | $ 1,100 | 12/66 | 222 | 68 | 290 | 35 |
| | PDP-10 | $ 11,000 | 10/67 | 29 | 6 | 35 | 30 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 70 | 30 | 100 | 20 |
| | 8400 | $ 10,000 | 6/65 | 19 | 6 | 25 | 1 |
| EMR Computer Division | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 16 | 0 | 16 | 2 |
| | ADVANCE 6040 | $ 5,600 | 7/65 | 8 | 3 | 11 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 24 | 6 | 30 | 20 |
| General Electric | 115 | $ 2,200 | 12/65 | 430 | 620 | 1050 | 220 |
| | 130 | $ 4,500 | 3/69 | 0 | 0 | 0 | 140 |
| | 205 | $ 2,900 | 6/64 | 14 | 0 | 14 | X |
| | 210 | $ 16,000 | 7/59 | 34 | 0 | 34 | X |
| | 215 | $ 6,000 | 9/63 | 20 | 3 | 23 | X |
| | 225 | $ 8,300 | 4/61 | 144 | 20 | 164 | X |
| | 235 | $ 12,500 | 4/64 | 115 | 23 | 138 | 17 |
| | 405 | $ 6,000 | 2/68 | 48 | 12 | 60 | 40 |
| | 415 | $ 11,000 | 5/64 | 345 | 115 | 460 | 30 |
| | 425 | $ 18,000 | 6/64 | 117 | 33 | 150 | 30 |
| | 435 | $ 25,000 | 9/65 | 32 | 9 | 41 | 14 |
| | 625 | $ 50,000 | 4/65 | 35 | 6 | 41 | 9 |
| | 635 | $ 60,000 | 5/65 | 53 | 6 | 59 | 22 |
| | 645 | $ 90,000 | 7/66 | 7 | 0 | 7 | 2 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 80 | 30 | 110 | 60 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 45 | 20 | 65 | 5 |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 18 | 2 | 20 | 2 |
| Hewlett-Packard | 200A | $ 2,500 | 11/68 | 1 | 0 | 1 | 68 |



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AS OF DECEMBER 1, 1968

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 74 | 2 | 76 | X |
| | DDP-116 | $ 900 | 4/65 | 203 | 43 | 246 | 17 |
| | DDP-124 | $ 2,050 | 3/66 | 56 | 18 | 74 | 18 |
| | DDP-224 | $ 3,300 | 3/65 | 48 | 10 | 58 | 2 |
| | DDP-516 | $ 700 | 9/66 | 180 | 50 | 230 | 150 |
| | H-110 | $ 2,500 | 9/68 | 22 | 2 | 24 | 100 |
| | H-120 | $ 4,200 | 1/66 | 778 | 192 | 970 | 90 |
| | H-125 | $ 5,000 | 12/67 | 70 | 15 | 85 | 115 |
| | H-200 | $ 8,600 | 3/64 | 827 | 348 | 1175 | 95 |
| | H-400 | $ 8,500 | 12/61 | 53 | 37 | 90 | X |
| | H-632 | $ 3,500 | 12/68 | 0 | 0 | 0 | 35 |
| | H-800 | $ 28,000 | 12/60 | 59 | 14 | 73 | X |
| | H-1200 | $ 11,600 | 2/66 | 230 | 60 | 290 | 98 |
| | H-1250 | $ 12,000 | 8/68 | 17 | 3 | 20 | 60 |
| | H-1400 | $ 14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,500 | 1/66 | 121 | 27 | 148 | 75 |
| | H-4200 | $ 20,500 | 9/68 | 4 | 0 | 4 | 22 |
| | H-8200 | $ 50,000 | 12/68 | 0 | 0 | 0 | 10 |
| IBM | 305 | $ 3,600 | 12/57 | 63 | 25 | 88 | X |
| | 360/20 | $ 2,800 | 12/65 | 5620 | 3880 | 9500 | 2450 |
| | 360/25 | $ 5,330 | 10/68 | 20 | 0 | 20 | 2600 |
| | 360/30 | $ 9,300 | 5/65 | 5400 | 3750 | 9150 | 800 |
| | 360/40 | $ 19,500 | 4/65 | 3000 | 1150 | 4150 | 500 |
| | 360/44 | $ 15,000 | 7/66 | 320 | 95 | 415 | 75 |
| | 360/50 | $ 33,000 | 8/65 | 1080 | 280 | 1360 | 740 |
| | 360/65 | $ 60,000 | 11/65 | 580 | 110 | 690 | 290 |
| | 360/67 | $138,000 | 6/66 | 41 | 9 | 50 | 33 |
| | 360/75 | $ 81,400 | 1/66 | 34 | 8 | 42 | 14 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 23 |
| | 360/90 Series | $150,000 | 11/67 | 8 | 0 | 8 | 11 |
| | 650 | $ 4,800 | 11/54 | 87 | 28 | 115 | X |
| | 1130 | $ 1,700 | 2/66 | 3380 | 1370 | 4750 | 2900 |
| | 1401 | $ 6,200 | 9/60 | 3150 | 2000 | 5150 | X |
| | 1401-G | $ 2,300 | 5/64 | 650 | 630 | 1280 | X |
| | 1401-H | $ 1,300 | 6/67 | 265 | 185 | 450 | X |
| | 1410 | $ 17,000 | 11/61 | 335 | 195 | 530 | X |
| | 1440 | $ 4,100 | 4/63 | 1700 | 1250 | 2950 | X |
| | 1460 | $ 9,800 | 10/63 | 630 | 120 | 750 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 885 | 480 | 1365 | X |
| | 1800 | $ 5,000 | 1/66 | 445 | 160 | 605 | 270 |
| | 7010 | $ 26,000 | 10/63 | 135 | 23 | 158 | X |
| | 702 | $ 6,900 | 2/55 | 4 | 0 | 4 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 19 | 2 | 21 | X |
| | 7040 | $ 25,000 | 6/63 | 56 | 44 | 100 | X |
| | 7044 | $ 36,500 | 6/63 | 89 | 32 | 121 | X |
| | 705 | $ 38,000 | 11/55 | 29 | 5 | 34 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 157 | 85 | 242 | X |
| | 7080 | $ 60,000 | 8/61 | 78 | 3 | 81 | X |
| | 709 | $ 40,000 | 8/58 | 3 | 0 | 3 | X |
| | 7090 | $ 63,500 | 11/59 | 30 | 6 | 36 | X |
| | 7094 | $ 75,500 | 9/62 | 94 | 3 | 97 | X |
| | 7094 II | $ 82,500 | 4/64 | 109 | 9 | 118 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 21 | 2 | 23 | X |
| | NCR-310 | $ 2,500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $ 8,700 | 5/62 | 533 | 277 | 810 | 30 |
| | NCR-315-RMC | $ 12,000 | 9/65 | 92 | 23 | 115 | 20 |
| | NCR-390 | $ 1,850 | 5/61 | 1000 | 450 | 1450 | X |
| | NCR-500 | $ 1,500 | 10/65 | 1700 | 780 | 2480 | 300 |
| | Century 100 | $ 2,645 | 9/68 | 50 | 0 | 50 | 850 |
| | Century 200 | $ 7,500 | 4/69 | 0 | 0 | 0 | 430 |
| Philco | 1000 | $ 7,010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $ 40,000 | 10/58 | 13 | 1 | 14 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,000 | 2/61 | 399 | 207 | 606 | X |
| | RCA 3301 | $ 18,000 | 7/64 | 75 | 10 | 85 | X |
| | RCA 501 | $ 14,000 | 6/59 | 76 | 2 | 78 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,100 | 9/65 | 149 | 66 | 215 | 63 |
| | Spectra 70/25 | $ 6,700 | 9/65 | 92 | 35 | 127 | 40 |
| | Spectra 70/35 | $ 8,000 | 1/67 | 140 | 60 | 200 | 140 |
| | Spectra 70/45 | $ 23,000 | 11/65 | 206 | 64 | 270 | 66 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 1 | 0 | 1 | 5 |
| | Spectra 70/55 | $ 33,300 | 11/66 | 13 | 2 | 15 | 16 |
| Raytheon | 250 | $ 1,200 | 12/60 | 123 | 49 | 172 | X |
| | 440 | $ 3,500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $ 3,200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp. | 650 | $ 500 | 5/66 | 23 | 0 | 23 | 0 |
| | 655 | $ 1,800 | 10/66 | 66 | 0 | 66 | 10 |
| | 660 | $ 2,000 | 10/65 | 10 | 0 | 10 | 2 |
| | 670 | $ 2,600 | 5/66 | 1 | 0 | 1 | 0 |
| | 4700 | $ 800 | 2/69 | 0 | 0 | 0 | 16 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 127 | 6 | 133 | 2 |
| | SDS-910 | $ 2,000 | 8/62 | 208 | 15 | 223 | 2 |
| | SDS-920 | $ 2,900 | 9/62 | 184 | 8 | 192 | 4 |
| | SDS-925 | $ 3,000 | 12/64 | 58 | 2 | 60 | 4 |
| | SDS-930 | $ 3,400 | 6/64 | 222 | 25 | 247 | 7 |
| | SDS-940 | $ 18,000 | 4/66 | 35 | 1 | 36 | 18 |
| | SDS-9300 | $ 8,500 | 11/64 | 33 | 2 | 35 | 2 |
| | Sigma 2 | $ 1,800 | 12/66 | 130 | 20 | 150 | 160 |
| | Sigma 5 | $ 6,500 | 8/67 | 50 | 16 | 66 | 68 |
| | Sigma 7 | $ 12,000 | 12/66 | 38 | 12 | 50 | 22 |
| Standard Computer Corp. | IC6000 | $ 18,000 | 5/67 | 13 | 0 | 13 | 12 |
| | IC4000 | $ 10,000 | 9/68 | 2 | 0 | 2 | 6 |
| Systems Eng Labs | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810A/B | $900/$1,100 | 8/66;9/68 | 130 | 11 | 141 | 52 |
| | 840 | $ 1,400 | 11/65 | 4 | 0 | 4 | X |
| | 840A/MP | $1,400/$1,600 | 8/66;10/67 | 76 | 2 | 78 | 40 |
| UNIVAC | I & II | $ 25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $ 21,000 | 8/62 | 75 | 13 | 88 | X |
| | File Computers | $ 15,000 | 8/56 | 10 | 0 | 10 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 104 | 72 | 176 | X |
| | 418 | $ 11,700 | 6/63 | 105 | 53 | 158 | 17 |
| | 490 Series | $ 32,000 | 12/61 | 198 | 31 | 229 | 32 |
| | 1004 | $ 1,900 | 2/63 | 1765 | 1015 | 2780 | 10 |
| | 1005 | $ 2,400 | 4/66 | 905 | 415 | 1320 | 50 |
| | 1050 | $ 8,500 | 9/63 | 186 | 85 | 271 | 5 |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1107 | $ 57,000 | 10/62 | 19 | 8 | 27 | X |
| | 1108 | $ 68,000 | 9/65 | 110 | 40 | 150 | 101 |
| | 9200 | $ 1,600 | 6/67 | 280 | 85 | 365 | 615 |
| | 9300 | $ 3,600 | 9/67 | 143 | 47 | 190 | 470 |
| | 9400 | $ 7,000 | 5/69 | 0 | 0 | 0 | 115 |
| | LARC | $135,000 | 5/60 | 2 | 0 | 2 | X |
| | | | TOTALS | 47,822 | 22,615 | 70,437 | 16,975 |

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.



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| | 1968-1969 High | 1968-1969 Low | 3 week Sales in 100's | 3 week High | 3 week Low | Last | 3 week Net Change | 3 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 3079 | 73 1/8 | 65 1/2 | 68 3/8 | - 2 1/4 | - 3.19 |
| American R & D | 207 | 122 1/2 | 491 | 182 1/2 | 159 3/4 | 180 | + 5/8 | + 0.35 |
| Ampex Corp. | 42 3/8 | 26 1/2 | 2698 | 39 | 35 | 36 1/2 | - 2 3/8 | - 6.11 |
| Bunker Ramo | 21 3/8 | 15 | 5833 | 17 | 15 1/2 | 16 3/8 | - 1/2 | - 2.96 |
| Burroughs | 255 3/4 | 157 | 2032 | 239 1/8 | 220 3/8 | 238 3/4 | + 2 1/4 | + 0.95 |
| Collins Radio | 101 | 53 | 1051 | 69 | 62 | 66 | - 2 5/8 | - 3.83 |
| Computer Sciences | 67 3/8 | 31 5/8 | 1455 | 65 1/2 | 53 7/8 | 64 3/4 | + 9 7/8 | +17.99 |
| Control Data | 163 1/2 | 124 1/4 | 4357 | 152 3/4 | 130 1/4 | 146 1/4 | + 3 7/8 | + 2.72 |
| Electronic Assoc. | 27 3/8 | 18 | 1260 | 25 1/4 | 21 1/8 | 23 5/8 | + 3/4 | + 3.28 |
| General Electric | 100 3/8 | 80 1/4 | 4565 | 95 3/4 | 89 | 90 5/8 | - 5 1/8 | - 5.35 |
| Honeywell | 139 3/4 | 89 3/8 | 2085 | 121 7/8 | 107 3/4 | 120 1/8 | + 7 1/8 | + 6.31 |
| IBM | 375 | 295 | 5691 | 313 | 295 | 299 3/4 | -12 1/4 | - 3.93 |
| ITT | 62 1/2 | 44 7/8 | 4722 | 56 1/8 | 53 | 55 1/4 | - 1 | - 1.77 |
| Litton | 104 3/4 | 62 | 7278 | 73 1/8 | 64 1/4 | 65 | - 8 3/4 | -11.86 |
| Memorex | 93 1/2 | 61 1/2 | 3663 | 78 1/2 | 66 1/2 | 71 | - 7 1/4 | - 9.26 |
| Nat. Cash Register | 154 1/2 | 99 1/2 | 1914 | 115 3/8 | 109 1/8 | 112 | - 5 | - 4.27 |
| RCA | 55 | 44 1/4 | 5656 | 48 1/8 | 44 1/4 | 44 7/8 | - 2 5/8 | - 5.52 |
| Raytheon | 54 | 33 1/4 | 3380 | 49 | 43 7/8 | 48 1/2 | + 1/4 | + 0.51 |
| Sanders | 66 1/2 | 41 3/4 | 1730 | 60 1/8 | 54 | 58 1/2 | - 1 3/4 | - 2.90 |
| Scientific Data | 117 1/2 | 79 3/4 | 2544 | 94 | 83 | 90 | - 3 1/2 | - 3.74 |
| SCM | 61 1/4 | 35 3/4 | 3718 | 47 1/8 | 42 | 45 7/8 | + 7/8 | + 1.94 |
| Singer | 88 7/8 | 62 3/4 | 1650 | 80 7/8 | 73 1/2 | 78 3/4 | -- | -- |
| Sperry Rand | 63 3/8 | 41 3/8 | 5357 | 51 | 44 1/4 | 49 1/4 | -- | -- |
| Teledyne | 143 7/8 | 90 1/8 | 2474 | 108 | 99 1/2 | 103 1/8 | - 4 3/4 | - 4.40 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 1.52 | - 1.46 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic DP | 75 1/2 | 42 | 718 | 73 | 63 1/4 | 73 | + 6 1/8 | + 9.16 |
| Calcomp | 53 1/4 | 26 3/4 | 1094 | 37 | 32 3/8 | 32 1/2 | - 4 1/8 | -11.26 |
| Clary Corp. | 32 3/8 | 12 1/4 | 923 | 25 7/8 | 21 3/8 | 25 5/8 | + 1 1/4 | + 5.13 |
| Computer Applications | 42 5/8 | 17 5/8 | 413 | 21 7/8 | 19 1/2 | 19 5/8 | - 1 5/8 | - 7.65 |
| Computing and Software | 91 | 43 1/2 | 306 | 91 | 76 3/4 | 90 1/4 | +11 1/4 | +14.24 |
| Data Proc. Fin. & Gen. | 72 1/2 | 46 1/2 | 1965 | 58 1/8 | 52 | 55 3/8 | - 2 3/8 | - 4.11 |
| Data Products | 28 7/8 | 17 1/8 | 3081 | 26 1/2 | 22 7/8 | 24 | - 1 1/2 | - 5.88 |
| Digital Equipment | 179 | 95 1/4 | 821 | 171 3/4 | 154 1/2 | 170 | - 3 | - 1.73 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 217 | 31 1/2 | 28 | 28 1/2 | - 3 1/8 | - 9.88 |
| Granite Computer | 58 7/8 | 35 1/2 | 820 | 44 7/8 | 35 1/2 | 43 1/2 | + 2 | + 4.82 |
| Greyhound Computer | 43 1/4 | 25 | 594 | 28 1/2 | 25 1/2 | 27 1/2 | - 1 1/8 | - 3.93 |
| Leasco | 143 | 70 3/4 | 2387 | 145 | 120 1/4 | 137 3/8 | -12 1/8 | - 9.65 |
| Levin-Townsend Comp. | 67 3/4 | 47 5/8 | 2368 | 57 1/2 | 49 1/8 | 52 1/2 | - 4 1/8 | - 7.28 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 1507 | 32 7/8 | 26 1/2 | 32 1/2 | + 3/4 | + 2.36 |
| Mohawk Data Sciences | 107 1/2 | 58 | 2771 | 68 7/8 | 59 3/4 | 66 | - 2 5/8 | - 3.82 |
| *Planning Research | 29 | 25 3/4 | 233 | 30 | 25 5/8 | 28 | - 1 3/4 | - 2.94 |
| Potter Instrument | 38 1/2 | 20 1/2 | 1526 | 35 1/4 | 27 1/8 | 33 1/8 | + 3 1/8 | +10.41 |
| Randolph Computers | 64 | 34 5/8 | 1546 | 43 5/8 | 36 1/4 | 42 3/4 | + 2 3/8 | + 5.88 |
| Systems Eng. Labs. | 42 5/8 | 26 5/8 | 896 | 30 | 27 5/8 | 29 5/8 | + 5/8 | + 2.15 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 0.53 | - 0.74 |

* Stock Split

| OVER-THE-COUNTER | 1968-1969 High Bid | 1968-1969 Low Bid | January 24, Bid | January 24, Asked | 3 weeks ago Bid | 3 week net change Bid | 3 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 36 | 14 1/2 | 34 | 36 | 34 1/2 | - 1/2 | - 1.45 |
| Aries Corp. | 24 | 12 1/2 | 19 | 20 | 17 1/2 | + 1 1/2 | + 8.57 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 18 1/2 | 19 1/2 | 18 1/2 | -- | -- |
| Computer Usage | 62 | 23 1/2 | 38 | 40 | 38 | -- | -- |
| Cyber-tronics | 19 | 10 1/2 | 10 7/8 | 11 3/8 | 12 1/8 | - 1 1/4 | -10.31 |
| Digitronics | 27 1/2 | 16 1/2 | 20 | 21 | 22 1/2 | + 2 1/2 | +11.11 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 13 5/8 | 14 | 15 1/2 | - 1 7/8 | -12.09 |
| Electronic Memories | 67 | 32 3/4 | 57 | 59 | 56 | + 1 | + 1.79 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 12 3/8 | 12 7/8 | 12 5/8 | + 1/4 | + 1.98 |
| Informatics, Inc. | 34 | 16 | 26 3/4 | ** | 27 | - 1/4 | - 0.93 |
| LMC Data, Inc. | 16 | 6 1/2 | 7 3/4 | 8 1/2 | 7 1/4 | + 1/2 | + 6.67 |
| Management Assistance | 16 3/4 | 9 1/4 | 14 5/8 | 14 7/8 | 14 7/8 | - 1/4 | - 1.68 |
| Optical Scanning Corp. | 145 | 71 | 114 | 118 | 118 | - 4 | - 3.39 |
| Recognition Equipment, Inc. | 101 | 38 1/2 | 67 | 69 | 76 | - 9 | -11.84 |
| Standard Computers | ** | ** | ** | ** | ** | ** | ** |
| Tally Corp. | 51 1/2 | 31 | 31 1/2 | 33 1/2 | 34 1/2 | - 3 | - 8.61 |
| TBS Computer Centers Corp. | 21 3/4 | 10 1/2 | 12 1/2 | 13 | 13 1/2 | - 1 | - 7.40 |
| University Computing | 185 | 57 | 145 | 149 | 155 | -10 | - 6.45 |



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EDP industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" FEBRUARY, 1969 SPECIAL REPRINT

The International Business Machines Corp., the world's dominant computer manufacturer, is being tested in court by the U.S. Department of Justice as well as by two companies in the data processing industry.

When IBM was challenged by Justice for its dominance in the punched card field, the result was a Consent Decree. There is much speculation that a similar decree may be the final resolution of the main elements in question at this time. Therefore, EDP Industry Report is reprinting – for consideration and analysis by interested parties – the Consent Decree which IBM signed early in 1956. It may well illustrate the type of settlement that can be expected in the current situation.

Prepared by the International Data Corporation, 60 Austin Street, Newtonville, Mass. 02160, 617-969-4020

# United States District Court

For the Southern District of New York

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| United States of America, *Plaintiff*, v. International Business Machines Corporation, *Defendant*. | Civil Action No. 72-344 |

## FINAL JUDGMENT

Plaintiff, United States of America, having filed its complaint herein on January 21, 1952; defendant International Business Machines Corporation (hereinafter called IBM) having appeared and filed its answer to the complaint denying the material allegations thereof; and plaintiff and defendant, by their attorneys, having consented to the entry of this Final Judgment, without trial or adjudication of any issue of fact or law herein and without any admission by either party with respect to any such issue;

Now, therefore, before any testimony has been taken herein, and without trial or adjudication of any issue of fact or law herein, and upon consent, as aforesaid, of each party hereto,

It is hereby ordered, adjudged, and decreed as follows:

### I

The Court has jurisdiction of the subject matter of this action and of the parties. The complaint states a claim upon which relief can be granted against IBM under Sections 1 and 2 of the Act of Congress of July 2, 1890, entitled "An act to protect trade and commerce against unlawful restraints and monopolies," commonly known as the Sherman Act, as amended.

## II

As used in this Final Judgment:

(a) "Tabulating card" shall mean a unit record card designed for the recording of data in the form of punched holes to be sensed by mechanical or electrical (including electronic) means.

(b) "Tabulating card machinery" shall mean machines and devices, and attachments therefor, used to make tabulating cards.

(c) "Tabulating system" shall mean any group of machines capable of entering, converting, receiving, classifying, computing and recording alphabetic and/or numeric accounting and/or statistical data by means of tabulating cards, and in which tabulating cards are used for storing data and communicating it within the system; provided that "tabulating system" shall not include "electronic data processing system" as hereinafter defined.

(d) "Tabulating machine" shall mean a machine or device and attachments therefor used primarily in a tabulating system.

(e) "Electronic data processing system" shall mean any machine or group of automatically intercommunicating machine units capable of entering, receiving, storing, classifying, computing and/or recording alphabetic and/or numeric accounting and/or statistical data without intermediate use of tabulating cards, which system includes one or more central data processing facilities and one or more storage facilities, and has either

(1) the ability to receive and retain in the storage facilities at least some of the instructions for the data processing operations required, or

(2) means, in association with storage, inherently capable of receiving and utilizing the alphabetic and/or numeric representation of either the location or the identifying name or number of data in storage to control access to such data, or

(3) storage capacity for 1,000 or more alphabetic and/or decimal numeric characters or the equivalent thereof.

(f) "Electronic data processing machine" shall mean a machine or device and attachments therefor used primarily in or with an electronic data processing system.

(g) "Standard tabulating machine" or "standard electronic data processing machine" shall mean a tabulating machine or an electronic data processing machine manufactured by IBM and made generally available to its customers.

(h) "Special purpose tabulating machine" or "special purpose electronic data processing machine" shall mean a tabulating machine or an electronic data processing machine designed and produced by IBM for use by a limited number of customers but not made generally available to all IBM customers.

(i) "New" machines shall mean tabulating or electronic data processing machines produced (1) by original assembly of new and/or used parts or components or, (2) as to any type of machine generally offered for lease which is not currently being so assembled but is being produced by rebuilding existing machines, by such rebuilding.

(j) "Point value" shall mean the dollar amount of the monthly charge made by IBM in respect of a tabulating or electronic data processing machine leased by IBM to its customers under its machine service agreements.

(k) "Service bureau business" shall mean the preparation with tabulating and/or electronic data processing machines of accounting, statistical and mathematical information and reports for others on a fee basis.

(l) "Service bureau" shall mean an organization emgated principally in the service bureau business.

(m) "Existing patent" (or "existing patents") means any United States letters patent (including, but not limited to, the patents listed in Schedule A to be filed in this Court within 30 days after the entry of this Final Judgment) or patent application, and any division, continuation, reissue or extension of such patent, relating, but only in so far as it relates, to tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems, owned or controlled by IBM on January 1, 1956, or under which IBM then had the power to grant licenses or sublicenses to other persons.

(n) "Future patent" (or "future patents") means any United States letters patent or patent application (exclusive of existing patents), and any division, continuation, reissue or extension of such patent, relating, but only in so far as it relates, to tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems, owned or controlled by IBM during the period of five years following January 1, 1956, or under which IBM during such period has the power to grant licenses or sublicenses to other persons.

(o) "Subsidiary" shall mean a corporation more than 50% of whose stock entitled to vote upon election of directors (other than preferred stock entitled to vote upon the failure of the corporation to pay certain dividends) is, directly or indirectly, owned by IBM.

(p) "Person" shall mean an individual, partnership, firm, association, government, governmental institution, or corporation other than individuals who are directors, officers, employees, agents, and representatives of IBM, but shall not include subsidiaries of IBM unless such inclusion is specifically provided for.

## III

The provisions of this Final Judgment applicable to IBM shall also be applicable to its subsidiaries, officers, directors, agents, employees, successors, assigns, and all persons acting under, through or for IBM, but shall not impose any obligation to do or omit any action outside the United States unless specifically provided for hereinafter.

## IV

(a) It is the purpose of this Section IV of this Final Judgment to assure to users and prospective users of IBM tabulating and electronic data processing machines at any time being offered by IBM for lease and sale an opportunity to purchase and own such machines at prices and upon terms and conditions which shall not be substantially more advantageous to IBM than the lease charges, terms and conditions for such machines.

(b) IBM is hereby ordered and directed, beginning not later than one year after the entry of this Final Judgment, to offer

(1) to sell, at any time during the period of 18 months next thereafter, to the lessee of any IBM tabulating or electronic data processing machine each such machine being used by such lessee;

(2) to sell new standard tabulating and electronic data processing machines of each type at any time thereafter currently being manufactured and offered for lease or sale by IBM; and

(3) to sell any new special purpose tabulating or electronic data processing machine to the user for whom it has been designed and produced by IBM.

(c) IBM is hereby ordered and directed to:

(1) establish a sale price for each machine offered for sale pursuant to paragraph (b)(1) of this Section IV which shall not be greater than the sale price for a new machine of the same type and model less 10% for each full year of age, computed from the date of first installation after original assembly or rebuilding, except that for machines more than eight years of age the price may not be more than 25% of such sale price;

(2) establish a sale price for each machine offered for sale pursuant to paragraphs (b)(2) and (b)(3) of this Section IV which shall have a commercially reasonable relationship to the lease charges for such machine;

(3) establish such other nondiscriminatory terms as may be appropriate to the sale of tabulating or electronic data processing machines, including, at the option of the purchaser, reasonable credit terms for purchasers having satisfactory credit ratings and such warranties as are customary for the sale of similar business machines;

(4) afford to its salesmen compensation for selling tabulating and electronic data processing machines which shall be not less favorable to them than their compensation for leasing the same machines;

(5) make a full and fair disclosure, in the solicitation of orders for tabulating and electronic data processing machines, of the prices and terms for the sale and lease of such machines;

(6) furnish in writing, upon written request, to each person inquiring concerning the lease or purchase of IBM tabulating or electronic data processing machines complete information concerning delivery dates and terms and conditions of lease and purchase of such machines; and

(7) fill purchase and lease orders for machines required to be sold by paragraph (b)(2) of this Section IV without discrimination between lease and purchase orders and, to the extent administratively practicable and permitted by law, in the order of their receipt.

(d) In any civil suit or proceeding instituted by the Plaintiff between two and ten years after the entry of this Final Judgment, in which IBM's compliance or noncompliance with the provisions of this Section IV shall be an issue, the burden of proof shall be upon IBM to establish that it has complied with the provisions of this Section IV.

V

(a) IBM is hereby enjoined and restrained from acquiring any used IBM tabulating or electronic data processing machine owned by another person or the Service Bureau Corporation hereinafter provided for in Section VIII of this Final Judgment otherwise than as (1) a trade-in on a purchase of a tabulating or electronic data processing machine from IBM or (2) a reasonable credit against sums then or thereafter payable to IBM by a customer.

(b) IBM is hereby ordered and directed to solicit, in the manner specified in the provisions of paragraph (c) of this Section V, from dealers in second-hand business machines orders for the purchase of any used IBM tabulating or electronic data processing machines acquired by IBM pursuant to paragraph (a) of this Section V. The price charged by IBM for any such machine shall not exceed 85% of the price computed pursuant to paragraph (c)(1) of Section IV of this Final Judgment.

(c) IBM is hereby ordered and directed:

(1) within one year after the entry of this Final Judgment, and each six months thereafter for a period of five years, to cause the provisions of this Section V to be published in at least two trade journals of general circulation among dealers in second-hand business machines;

(2) commencing one year after the entry of this Final Judgment, to furnish at intervals of not more than 30 days to all dealers in second-hand business machines who shall within the preceding 180 days have made written requests therefor, and to at least one national trade association of such dealers, a list of all tabulating and electronic data processing machines acquired by IBM pursuant to paragraph (a) of this Section V since the date of the making of the last such list, and the prices thereof; and

(3) to keep all machines listed in the information furnished pursuant to subparagraph (2) of paragraph (c) of this Section V available for inspection and purchase by one or more of such dealers for a period of 60 days after such information shall have been furnished.

VI

IBM is hereby ordered and directed:

(a) to offer to render, without separate charge, to purchasers from it of tabulating or electronic data processing machines the same type of services, other than maintenance and repair services, which it renders without separate charge to lessees of the same types of machines;

(b) to offer, commencing one year after entry of this Final Judgment and so long thereafter as IBM shall continue to render repair and maintenance service, to maintain and repair at reasonable and nondiscriminatory prices and terms IBM tabulating and electronic data processing machines for the owners of such machines; provided that, if any such machine shall be altered, or connected by mechanical or electrical means to another machine, in such a manner as to render its maintenance and repair impractical for IBM personnel having had the standard training and instruction provided by IBM to such maintenance and repair personnel, then IBM shall not be required by this Final Judgment to render maintenance and repair service for such IBM machine; and

(c) to offer to sell at reasonable and nondiscriminatory prices and terms, to owners of IBM tabulating or electronic data processing machines (whether or not the purchaser receives IBM repair and maintenance service) and to persons engaged in the business of maintaining and repairing such machines and during the period when IBM has such parts and subassemblies available for use in its leased machines, repair and replacement parts and subassemblies for any tabulating machines or electronic data processing machines manufactured by IBM.

## VII

(a) IBM is hereby enjoined and restrained, for a period of ten years after entry of this Final Judgment, from entering into any lease for a standard tabulating or electronic data processing machine for a period longer than one year, unless such lease is terminable after one year by the lessee upon not more than three months' notice to IBM.

(b) IBM is hereby enjoined and restrained from requiring any lessee or purchaser of an IBM standard tabulating or electronic data processing machine to disclose to IBM the use to be made of the machine.

(c) IBM is hereby enjoined and restrained from requiring any purchaser of an IBM tabulating or electronic data processing machine to have it repaired or maintained by IBM or to purchase parts and subassemblies from IBM.

(d) IBM is hereby enjoined and restrained from:

(1) requiring any lessee or purchaser of an IBM tabulating or electronic data processing machine to purchase tabulating cards from IBM or directly or indirectly discriminating against any such person by reason of the fact that cards not manufactured by IBM are used.

(2) prohibiting, or in any way subjecting to IBM control or approval, experimentation with such machine, or

(3) prohibiting, or in any way subjecting to IBM control or approval, alterations in or attachments to such machine;

provided, however, that this Section VII (d) shall not be construed to restrain IBM from including in any agreement with any lessee of such a machine provisions reasonably designed to prevent such interference with the normal and satisfactory operation and maintenance of such machine as will substantially increase the cost of maintenance thereof.

## VIII

(a) IBM is hereby ordered and directed to transfer, within one year after the date of entry of this Final Judgment, all its contracts for service bureau business to a corporation (hereinafter called the Service Bureau Corporation), which may be wholly owned by IBM, and IBM shall thereafter be enjoined and restrained from engaging in the service bureau business except on a non-discriminatory basis for the Service Bureau Corporation and for service bureaus operated by other persons.

(b) The Service Bureau Corporation shall be enjoined and restrained from:

(1) using any corporate name containing the words International Business Machines or IBM;

(2) employing any person also employed by IBM, or any person to solicit for IBM any order for the sale or lease of any IBM tabulating or electronic data processing machines or system;

(3) after three years following the date of the entry of this Final Judgment, subleasing space from IBM at the locations of more than 20% of its bureaus; or

(4) for a period of five years after the organization of the Service Bureau Corporation, having a board of directors the majority of which is constituted of persons who previously have not been approved by this Court.

(c) The Service Bureau Corporation shall be ordered and directed to:

(1) maintain, in accordance with good accounting practice, separate and complete corporate records and accounts which shall be audited annually by independent public accountants; and

(2) charge for services rendered by it prices based upon rates which shall fairly reflect all expenses properly chargeable thereto provided, however, that nothing herein contained shall prevent the Service Bureau Corporation from reducing any price to meet an equally low price of a competitor.

(d) IBM is hereby ordered and directed to notify promptly service bureaus using IBM machines of the availability for purchase or lease as required by this Final Judgment of each new type of standard tabulating machine and electronic data processing machine offered by IBM for general use by its customers and of each new type of special purpose tabulating machine and electronic data processing machine made available to the Service Bureau Corporation, and the prices, terms and conditions for the sale or lease thereof.

(e) IBM is hereby enjoined and restrained from furnishing to the Service Bureau Corporation any tabulating or electronic data processing machines except upon the same terms, conditions and delivery schedules that such machines are furnished to any other service bureau.

(f) IBM is hereby ordered and directed to furnish, upon written application and at reasonable and nondiscriminatory charges, to any person engaged, or proposing to engage, in the operation of a service bureau using IBM machines copies of any pamphlets, books of instruction or other similar documents which it furnishes to the Service Bureau Corporation relating to the operation and application of IBM tabulating or electronic data processing machines for service bureau business.

## IX

IBM is hereby ordered and directed:

(a) For a period of five years from the date of this Final Judgment, upon written request, to afford to any person (other than agents or employees of a manufacturer of tabulating or electronic data processing machines) who is engaged, or proposes in good faith to engage, in the repair and maintenance or distribution of IBM tabulating machines and/or electronic data processing machines the opportunity to obtain training in the repair and maintenance of such IBM machines, which shall be substantially equivalent in method and nature to such training then being given by IBM to its customer engineering employees. Reasonable and nondiscriminatory charges may be made to reimburse IBM for the cost of furnishing such instruction and any materials furnished to such person taking instruction.

(b) Upon written request to furnish, at reasonable and nondiscriminatory charges made to reimburse IBM for the cost of furnishing them, to any owner of an IBM tabulating or electronic data processing machine and to any person eligible to receive training pursuant to paragraph (a) of this Section IX copies of any technical manuals, books of instruction, pamphlets, diagrams or similar documents, which it furnishes generally to its own repair and maintenance employees relating to tabulating or electronic data processing machines and which pertain to such training.

(c) Upon written request to furnish, on a nondiscriminatory basis, without charge or at a reasonable charge made to reimburse IBM for the cost of furnishing them, to purchasers and lessees of IBM tabulating machines and electronic data processing machines, copies of manuals, books of instruction, pamphlets, diagrams, or similar documents which pertain to the operation or application of such machines owned or leased by such purchasers or lessees.

## X

(a) IBM is hereby enjoined and restrained from:

(1) Entering into, maintaining, adhering to, or furthering, directly or indirectly, any contract, agreement, or understanding with or otherwise inducing any manufacturer, distributor, or vendor of raw materials suitable for the manufacture of tabulating cards to discriminate against or refuse to deal with third persons who buy or offer to buy such raw materials.

(2) Discriminating in price between different purchasers of tabulating cards of like grade and quality, provided that this provision shall not prevent differentials which (A) make only due allowance for differences in the cost of manufacture, sale, or delivery resulting from the differing methods or quantities in which such commodities are to such purchasers sold or delivered, or (B) are made to meet an equally low price or a competitor. In any proceeding to enforce the provisions of this paragraph, IBM shall have the burden of establishing to the satisfaction of this Court that its price differentials are in fact so justifiable.

(3) Prescribing, fixing, establishing, or maintaining arbitrary, unreasonable, or unnecessary specifications for tabulating cards used in standard and special purpose tabulating machines leased or repaired and maintained by IBM.

(4) Entering into, maintaining, adhering to, or furthering, directly or indirectly, any contract, agreement or understanding with or otherwise inducing any manufacturer, distributor or vendor of tabulating card machinery to discriminate against or refuse to deal with third persons who buy or order to have manufactured and buy such machinery.

(b) IBM is hereby ordered and directed, for a period of five years following the date of entry of this Final Judgment to offer to sell rotary presses in good condition, of the types used by IBM for the manufacture of tabulating cards, upon reasonable and nondiscriminatory terms and conditions to any person who (1) is engaged, or proposes in good faith to engage, in the manufacture of tabulating cards and (2) has been unable to obtain delivery of such presses, as required for his needs, within a reasonable time from manufacturers of printing presses; provided, that IBM shall not be obliged to deliver more than 30 presses in each year.

(c) IBM is hereby ordered and directed, for a period of five years following the date of entry of this Final Judgment, to offer to sell, from its reserve stocks of paper suitable for the manufacture of tabulating cards, any such paper not required for the reasonably anticipated needs of IBM, to any person who (1) is engaged, or proposes in good faith to engage, in the manufacture of tabulating cards and (2) has been unable to obtain delivery of such paper, as required for his needs, from manufacturers of such paper in the United States. IBM may charge for such paper amounts sufficient to reimburst IBM for its costs.

(d) Seven years from the date of entry of this Final Judgment IBM shall divest itself, upon terms and conditions approved by this Court, of such part of its then existing capacity for the manufacture of tabulating cards as may then be in excess of 50% of the total capacity for the manufacture of tabulating cards in the United States, unless subsequent to four years after the entry of this Final Judgment IBM shall have shown to the satisfaction of this Court that substantial competitive conditions exist in the manufacture, sale and distribution of tabulating cards or that such divestiture is not then necessary or appropriate.

## XI

(a) IBM is hereby ordered and directed to grant to each person making written application therefor an unrestricted, nonexclusive license to make, have made, use and vend tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems under, and for the full unexpired term of, any, some or all IBM existing and future patents.

(b) IBM is hereby enjoined and restrained from making any sale or other disposition of any existing or future patent which deprives it of the power or authority to grant such licenses, unless the purchaser, transferee or asignee shall file with this Court, prior to consummation of said transaction, an undertaking to be bound by the provisions of this Section XI with respect to such patent.

(c) IBM and its subsidiaries are ordered and directed, in so far as they have power and right to do so, to grant upon written request and without compensation to a person licensed under any IBM existing or future patent or patents pursuant to Section XI of this Final Judgment, with respect to any products manufactured in the United States pursuant to such license, a nonexclusive grant of immunity from suit under any corresponding foreign patent or application owned or controlled by IBM or a subsidiary of IBM.

(d) IBM is hereby enjoined and restrained from including any restriction whatsoever in any license granted by it pursuant to the provisions of this Section XI except as hereinafter provided:

(1) the license may be nontransferable;

(2) a reasonable royalty may be charged (except for licenses under existing patents to make, have made, use and vend tabulating cards and/or tabulating card machinery, which shall be royalty-free), which royalty shall be non-discriminatory as among royalty-paying licensees procuring the same rights under the same patents, provided that the royalty charged an applicant who grants a patent license to IBM may reflect the fair value of such license;

(3) reasonable provision may be made for periodic royalty reports by the licensee and inspection of the books and records of the licensee by an independent auditor, an independent engineer or any person acceptable to both licensor and licensee, who shall report to the licensor only the amount of the royalty due and payable;

(4) reasonable provision may be made for cancellation of the license upon failure of the licensee to make the reports, pay the royalties or permit the inspection of his books and recores as hereinabove provided; and

(5) the license must provide that the licensee may cancel the license in whole or as to any specified patents at any time after one year from the initial date thereof by giving 30 days' notice in writing to the licensor.

(e) Upon receipt of written application for a license under the provisions of this Section XI, IBM shall advise the applicant in writing of the royalty which it deems reasonable for the patent or patents to which the request

pertains. If the applicant rejects the royalty proposed by IBM and if the parties are unable to agree upon a reasonable royalty within 120 days from the date such rejection is communicated in writing to IBM, the applicant or IBM may,upon notice to the Attorney General, apply to this Court for the determination of a reasonable royalty. In any such proceeding, the burden of proof shall be on IBM to establish the reasonableness of the royalty requested by it. Pending the completion of negotiations or any such proceedings, the applicant shall have the right to make, have made, use and vend under the patents to which his application pertains without payment of royalty or other compensation. A final Court determination of reasonable royalty shall be applicable to the applicant, and to any other licensee then having or thereafter obtaining the same rights under the same patents, at the option of such other licensee, from the date upon which the applicant requested such license. If the applicant fails to accept a license, such applicant shall pay the court costs in such proceedings and any royalties found by the Court to be due to IBM.

(f) Nothing herein shall prevent any applicant from attacking, in the aforesaid proceedings or in any other controversy, the validity or scope of any of the patents, nor shall this Final Judgment be construed as imputing any validity to any of said patents.

(g) The provisions of this Section XI shall not require IBM to grant a license to any applicant unless:

(1) for a license under an existing patent (except an existing patent relating to tabulating cards and/or tabulating card machinery), said applicant agrees not to bring suit under any, some or all of the United States patents and patents issued on applications owned or controlled by said applicant or under which said applicant has the power to grant licenses on the date of the request by the applicant for a license, for infringement by IBM arising out of the manufacture, use or sale of tabulating machines or systems or electronic data processing machines or systems of the types and models being manufactured or used by IBM in its regular line of business on the date of the request by the applicant, without first having offered to IBM a nonexclusive license for a reasonable royalty under and for the full life of said patent or patents claimed by the applicant to be infringed;

(2) for a license under a future patent (except a future patent relating to tabulating cards and/or tabulating card machinery), said applicant agrees upon request to grant to IBM, for a reasonable royalty and for the full, unexpired term of each licensed patent, a nonexclusive license, or the right to obtain a nonexclusive license, to make, have made, use and vend tabulating machines or systems, or electronic data processing machines or systems under any, some or all of the United States patents and applications owned or controlled by said applicant or under which said applicant has the power to grant licenses on the date of the request by the applicant for a license;

(3) for a license under a future patent relating to tabulating cards or tabulating card machinery, said applicant agrees upon request to grant to IBM, for a reasonable royalty and for the full, unexpired term of each licensed patent, a nonexclusive license, to make, have made, use and vend tabulating cards or tabulating card machinery under any, some or all of the United States patents and applications owned or controlled by said applicant or under which said applicant has the power to grant licenses on the date of the request by the applicant for a license; and

(4) in any event, the applicant agrees upon request to grant without compensation, for any products manufactured in the United States pursuant to such license to IBM, a nonexclusive grant of immunity to IBM and any subsidiary of IBM from suit under any corresponding foreign patent or application then owned or controlled by said applicant.

For the purpose of this Section XI(g), a patent shall be deemed to be owned or controlled by an applicant if it is owned or controlled by the applicant, a subsidiary of the applicant, by a person whose subsidiary the applicant is, or by a person on behalf of whom the applicant then is acting as an agent with respect to the manufacture, use or sale or tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems or parts for such machines. Determination of a reasonable royalty for any license to IBM under this Section XI(g) shall be made in the same manner as provided in Section XI(e) for determination of the reasonable royalty for a license granted by IBM, provided that in any proceeding for determination of a reasonable royalty under this Section XI(g) the burden of proof shall be on the person from whom IBM has requested a license to establish the reasonableness of the royalty requested by it.

## XII

IBM is enjoined and restrained from instituting, or threatening to institute, any action, suit or proceeding under Sections 281 *et seq.* of Title 35, United States Code (1953), against any person for acts of infringement of existing patents alleged to have occurred prior to the entry of this Final Judgment, except by way of counterclaim in any action brought by any person against IBM; provided, however, that such counterclaim shall not include any claim for infringement of any existing patent relating to tabulating cards or tabulating card machinery.

## XIII

(a) IBM is ordered and directed to terminate upon the request of the licensee any existing patent-licensing agreement which is inconsistent with the provisions of Section XI of this Final Judgment and to grant new licenses to licensees affected by this provision upon the terms and conditions specified in Section XI of this Final Judgment.

(b) IBM is hereby enjoined and restrained for a period of five years from the date of entry of this Final Judgment from entering into, adhering to, maintaining, furthering, or renewing, directly or indirectly, any contract, agreement, understanding, or arangement with any person relating to tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems which:

(1) grants exclusively to IBM a license, sublicensing right, or immunity under any patent, unless (A) IBM shall have failed in a bona fide effort to obtain a nonexclusive license under such patent and (B) such grant shall permit IBM to grant sublicenses under such patent as required pursuant to Section XI; and

(2) provides for disclosure to IBM on an exclusive basis of any invention, formula, process or technical information, other than the results of joint development programs undertaken by IBM and such person or work done by established research or engineering organizations on behalf of IBM.

(c) IBM is hereby enjoined and restrained for a period of ten years from the date of entry of this Final Judgment from retaining any individual inventor or engineer for work on the design and development of tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems except:

(1) as an employee having regular hours of employment, or a retired IBM employee; or

(2) under contracts for research, development or engineering services which commit the inventor or engineer to provide personal services for periods of not more than one year.

## XIV

(a) IBM is hereby ordered and directed for the period of five years after the entry of this Final Judgment to furnish to each licensee under Section XI of this Final Judgment making written application therefor the technical information enumerated in paragraph (b) of this Section XIV, with respect to, and for use in the manufacture in the United States of:

(1) the IBM tabulating machines listed in Appendix A of this Final Judgment;

(2) tabulating cards; or

(3) tabulating card machinery

manufactured by or to the order of IBM and used commercially at any time during the five years immediately preceding the date of the entry of this Final Judgment. IBM may make reasonable and nondiscriminatory charges for furnishing such technical information pursuant to paragraphs (b) and (c) of this Section XIV which shall not exceed the costs to IBM of furnishing it.

(b) The technical information to be furnished pursuant to paragraph (a) of this Section XIV shall consist of copies of the most current documents (including, but not limited to, schematic and detailed working drawings, specifications of material, prescribed production methods, and assembly drawings) employed by IBM prior to the date of the entry of this Final Judgment in the manufacture and assembly of such tabulating machines, tabulating cards, or tabulating card machinery, but shall not include information relating to typewriters or machines and devices for controlling, measuring or recording time, tolls or production.

(c) In the event that any applicant represents to IBM in writing that the technical information furnished by IBM is inadequate to enable him satisfactorily to manufacture or assemble the standard tabulating machines, tabulating cards, or tabulating card machinery covered thereby, IBM shall supply such applicant such further explanation of the information supplied as may be reasonably necessary for that purpose.

## XV

(a) IBM is hereby enjoined and restrained from entering into, adhering to, maintaining, or furthering, directly or indirectly and whether inside or outside the United States, any contract, agreement, understanding, plan or program with any person engaged in the manufacture, sale, distribution or repair and maintenance of tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems to:

(1) divide sales or manufacturing territories;

(2) allocate markets among manufacturers; or

(3) limit, restrain, or prevent the import into, or export from, the United States, its territories and possessions, of tabulating cards, tabulating card machinery, tabulating machines or systems, or electronic data processing machines or systems.

(b) IBM is hereby enjoined and restrained from conditioning the sale or lease of any standard tabulating or electronic data processing machine (which shall include any machine unit on a separate base even if in normal use it is mechanically or electrically connected with another such machine unit) upon the purchase or lease of any other standard tabulating or electronic data processing machine.

## XVI

(a) IBM is ordered and directed (1) within 90 days after the entry of this Final Judgment (A) to furnish a true and complete copy of this Final Judgment to each of its officers, directors and employees at the policy level, its engineering personnel, its employees engaged in selling tabulating machines, tabulating cards and electronic data processing machines, its patent licensees and all its present lessees, and (B) to notify all its lessees that their leases shall be deemed to have been modified to the extent, if any, necessary to conform to the provisions of this Final Judgment, and within 15 days thereafter to file with the Clerk of this Court its affidavit affirming that IBM has complied with the foregoing terms of this paragraph (a) of Section XVI; and (2) at any time within ten years after the entry of this Final Judgment to furnish to anyone, upon written request, a copy of Schedule A.

(b) IBM is ordered and directed, on or before March 31 of each of the first ten years following the year in which IBM first offers machines for sale pursuant to Section IV of this Final Judgment, to furnish to the Attorney General, for the preceding calendar year:

(1) a statement showing the sales and lease prices effective during such year, for each type of IBM standard tabulating and electronic data processing machine;

(2) a statement showing the number and the aggregate point values of each class of standard tabulating and electronic data processing machines sold by IBM in the United States pursuant to Sections IV(b)(2) and V of this Final Judgment, less the total point values of such machines reacquired by IBM, during such year;

(3) a statement showing the number and the aggregate point values of each class of standard tabulating and electronic data processing machines owned by IBM and placed in use by customers in the United States, less the total point values of such machines owned by an returned to IBM during such year;

(4) a statement showing the number and the aggregate point values of each class of tabulating and electronic data processing machines sold by IBM during such year pursuant to Section IV(b)(1) of this Final Judgment; and

(5) a statement showing the number of tabulating machines acquired by IBM pursuant to paragraph (a) of Section V of this Final Judgment and in respect of each such machine resold to a dealer in second-hand business machines pursuant to paragraph (b) of Section V, its type, age, resale price and the price of a new machine of the same type.

## XVII

For the purpose of securing compliance with this Final Judgment, duly authorized representatives of the

Department of Justice shall upon request of the Attorney General or the Assistant Attorney General in charge of the Antitrust Division and on reasonable notice to IBM made to its principal office be permitted, subject to any legally recognized claim of privilege approved by this Court, (a) access during the office hours of IBM to all books, ledgers, accounts, correspondence, memoranda and other records and documents in the possession, custody, or control of IBM relating to any matters contained in this Final Judgment, and (b) subject to the reasonable convenience of IBM but without restraint or interference from it, to interview officers, directors, agents, or employees of IBM, who may have counsel present, regarding any such matters. For the purpose of securing compliance with this Final Judgment, IBM upon the written request of the Attorney General, or the Assistant Attorney General in charge of the Antitrust Division, and upon reasonable notice to its principal office, shall submit such written reports with respect to any of the matters contained in this Final Judgment as from time to time may be necessary for the purpose of enforcement of this Final Judgment.

## XVIII

Information obtained by the means provided in Sections XVI and XVII of this Final Judgment shall not be divulged by any representative of the Department of Justice to any person other than a duly authorized representative of such Department, except in the course of legal proceedings to which the United States is a party for the purpose of securing compliance with this Final Judgment or as otherwise required by law.

## XIX

Jurisdiction is retained for the purpose of enabling either of the parties to this Final Judgment to apply to this Court at any time for such further orders and directions as may be necessary or appropriate for the construction or carrying out of this Final Judgment, for the modification or termination of any of the provisions contained herein and for the enforcement of compliance therewith and the punishment of the violation of any of the provisions contained herein.

## XX

The provisions of this Final Judgment shall not be deemed to have any effect on the judgments entered in this Court on December 26, 1935, and January 29, 1936, in *United States v. International Business Machines Corporation, et al.*

Dated: January 25th, 1956.

David N. Edelstein
United States District Judge

We consent to the making and entry of the foregoing Final Judgment:

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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 12,1969 • VOL.4,NO.13 P.J.McGOVERN,EDITOR

## COMPUTER SYSTEM FOR TRADING LARGE BLOCKS OF STOCK WOULD SAVE INSTITUTIONS MONEY BUT PERHAPS WEAKEN STOCK MARKET

A new type of investment industry computer service -- latest in the expanding group of Rair* services that will account for an estimated $180 million in revenues to participants this year -- threatens to cause significant changes in the stock market's operation. Indeed, in some quarters this Instinet service, as it is called, is considered a threat to the national auction market provided by the New York stock exchanges.

Set up by a new company called Institutional Networks Corp. (Instinet), the service involves a national computer network which could enable banks, insurance companies, mutual funds, and other institutional investors to buy and sell blocks of securities among themselves at a carefully negotiated price and without brokerage charges. The service is offered to subscribers interested in buying or selling blocks of securities of at least 500 shares worth a minimum of $25,000.

Subscribers to the Instinet service will communicate via Teletype KSR-28 terminals which will be linked by direct telephone lines to Watertown, Mass. and the Univac 494 computer which is the nucleus of Keydata Corp.'s own Rair service operation. In many areas, such as New York City, subscribers would actually communicate first with a Honeywell DDP-516 computer which concentrates messages before they are sent over the long-distance telephone lines to the Boston suburb.

### On-line negotiation for securities

When the system is in operation, subscribers will be able to transmit the name of securities they would like to buy or sell -- along with the quantity, price, and any time limit between 15 minutes and a week -- to the computer's central offer file. Prices in the system can be quoted in decimals to the nearest penny instead of fractions to the nearest 1/8 th of a dollar. Offers to sell a security would be added to the central file of all other "live" buy and sell orders for that security.

An institutional investor who wanted to buy a particular security would simply strike a few keys on his office terminal and the Instinet system would immediately print out the offer file for that security. If the buyer finds that other subscribers have offered the desired security for sale, he can buy the number of

*Rair: Remote Access/Immediate Response. See EDP/IR Aug. 29, 1968

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shares he desires at one or more of the prices listed in the file. Or, if he did not wish to purchase the shares at the price(s) listed, he may begin negotiating for a better price, using the communication network established by the terminals and the computer. The instant the buyer and seller reach agreement, the computer revises the offer file to reflect the exchange, then prints out notices of a completed transaction on both the buyer's and seller's terminals simultaneously.

If a subscriber finds that no one is offering to sell the security he wishes to buy, he can use the Instinet system to broadcast to all subscribers the name of the security he wishes to purchase and the price he will pay. This information would instantly be printed out on all subscriber terminals, and any institution that is willing to sell at the suggested price can immediately make the transaction through the system. If a sale were possible but the price was not, a subscriber could react to a broadcast request by entering into private negotiation. In any event, all broadcast bids or offers for a security are immediately added to the file for that security and are binding on the institutions originating them until transacted, revised, withdrawn, or dropped because the time limit has expired. Price shopping, in this manner, is possible . . . simply getting a "bid" from the system, however, is not.

Any time that a subscriber communicates an offer to buy or sell into the Instinet system, he is automatically assigned a different offer number that will identify him and so that he may conduct all negotiations anonymously and confidentially. Subscribers may communicate directly, but they will know each other only as transaction numbers. And subscribers won't know whether they are dealing with the same people in different transactions: Two consecutive numbers could belong to subscribers in different parts of the country, in the same building, or to the same person.

Potential problems . . . for Instinet and brokers

Before the Instinet system becomes viable, it will have to provide its subscribers with a large market. To date, however, potential customers have been reluctant to commit themselves and there are few if any actual customers. A company spokesman says that the system will start into operation (at reduced rates) when 15 to 20 institutional investors are signed up. He was reluctant to estimate the number of subscribers that will ultimately be attracted to Instinet, but some outside sources estimate that there could easily be hundreds of users, perhaps as many as 500. EDP/IR understands that charges for system use will not reach the published rates until a certain number -- perhaps 100 -- of subscribers are signed up for the service.

The minimum monthly fee for subscribers, at full rates, will be $1740 plus communication charges and data processing unit charges based on the use of the system. The average monthly bill to subscribers is expected to be between $2000 and $4000. The system will operate from 9:30 a.m. to 4:30 p.m. Eastern time, Monday through Friday. At the end of each day aggregate transaction figures will be made public for publication in financial journals and newspaper pages.

If the system becomes fully operational, it will take a lot of business away from existing stock exchanges. During 1968, for example, it is estimated that block transactions accounted for 10% of all trading volume on the New York Stock Exchange, and much of this could be expected to be handled over the Instinet system. The brokerage houses that now handle these transactions can be expected to resist the implementation of the system and the accompanying loss of commissions.



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Some of the arguments against Instinet are that a central auction market -- in particular, the New York Stock Exchange -- is necessary to the national economy. Proponents, on the other hand, say that the effect of Instinet on this is doubtful. For one thing, they argue, most institutions, and especially mutual funds, have an obligation to purchase securities at the best competitive price and therefore that prices in the system and on the Exchange will stay quite close.

Today, there are other markets than the NYSE. Regional exchanges do some business, and there is the "third market" in which, for a negotiated fee usually much less than a broker's commission, buyers and sellers are brought together. Instinet, operating perhaps as a "fourth market," say its supporters, would simply perform the same function but in a more efficient manner. Also, it should be noted, Instinet would eliminate any specific transaction fee.

There has been the suggestion that Instinet should be required to register with the Securities and Exchange Commission as a regulated securities market. Instinet spokesmen will only say that "the SEC is aware of us." Talks between them are apparently under way.

Behind the scene

The entrepreneur behind Instinet is Herbert R. Behrens, president and board chairman of the Institutional Networks Corporation, who has been associated with member firms of the New York Stock Exchange for 14 years. He began work on the ideas behind Instinet in 1963 and, two years ago, he turned to Keydata to design and actual system and write the programs involved. The system, which required over 25,000 man-hours for development, is operated and maintained by Keydata.

Indeed, Instinet could become one of Keydata's best customers and provide, finally, the system load that could push Keydata, at long last, into black ink. Keydata was started late in 1965 as "the first commercial time-sharing utility," and has been watched carefully by industry observers ever since. Today, the company bills itself as "the business computer utility," an appropriate description. Its service is not really time sharing; it is a good example of Rair.

Keydata presently provides two basic business data processing services: Distribution Accounting, which includes on-line in real-time invoicing, inventory control, accounts receivable, and sales analyses; and Accounts Payable, which includes expense distribution, cash requirement reporting, check writing, and general ledger. The services are used primarily by distributors and manufacturers.

At present, there are about 150 user lines connected to Keydata's Univac 494 computer, and the system has the capacity of 800 to 1000 lines. With this load, the company's controller reports, operations are "almost" running at breakeven. Since Keydata has been through severe financial problems, reorganization, and consolidation since it was founded by Charles Adams, profitable operations will be a most pleasant surprise for both employees and the various investors that have provided it support during the "early years."

Instinet, as a Keydata customer, will essentially be wholesaling computer time through the Keydata network and paying the company to provide programs and computer power. This technique is new in the Rair marketplace, but it is coming into more accepted use and likely will be quite commonplace as the market develops. Here we have one company with capabilities in computers and communications, another that has a product and marketing for that product. It will be interesting to watch.



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## IBM APPEARS TO BE GETTING READY FOR THE MODEL 10 -- OR SOME SMALL MACHINE

*Twenty-Two Now Open, More to Come . . .*

That's how IBM prefaced its press release that announced the establishment of 22 Basic Systems Centers across the country. These centers, "the first of about 50 planned for this year," are to bring technical guidance to all users of 360/20s, 1130s, the 6400 accounting machines, and all unit record equipment. At each center, IBM says, "customers may write and test computer programs and wire control panels for electronic accounting machines."

Apparently IBM has decided that all small organizations -- from local liquor distributors, to research and development laboratories, to banks, for example -- have similar problems and therefore should be treated as a small data processing customer rather than as a member of a particular industry. This may well be true.

But to EDP/IR, this organizational readjustment looks like a marketing ploy to ready IBM and its customers for the introduction of what internally is called the "3.7": the very small computer that apparently will serve as a terminal; that will replace much existing punched-card equipment; and that really will provide the small business data processing power which currently is being implemented -- with varying degrees of success -- on the 360/20 or with specialized programs written for the 1130.

The exact date of the 3.7's announcement is not known, but it appears imminent. Considering the pending litigation filed by Control Data, DPF&G, and the Justice Department, IBM may well postpone announcement of this or any other new hardware until it has made the promised announcement about changes in pricing that has been set for spring or early summer. But the new organization being set up could be another step in the gradual change in marketing organization (EDP/IR Oct.30,1968) that has seen the establishment of the Commercial Region and the GEM (Government, Education, and Medicine) marketing group. This latest organization, Basic Systems Centers, could well form the nucleus of one more separate marketing group that, if absolutely necessary or desirable, could be operated separately.

## XEROX AND SDS COME CLOSER TO MERGER

Earlier this month, the directors of both Xerox Corp. and Scientific Data Systems, Inc, approved the proposed acquisition of SDS by Xerox. Stockholder approval, at annual meetings set for May, shouldn't be a problem, so about the only thing that could hold up the merger now is a stop sign from the Justice Dept's Antitrust Div., which is known to be looking into this and other conglomerate mergers.

It's a little too early to know what the merger will mean within the data processing marketplace. SDS spokesmen say the merger will "bring us the resources we need in order to expand our product and market horizons" and will "give us an entry into the business systems environment, which is the largest segment of the computer industry." Xerox says that "computers are at the very heart of the office and business-systems environment, and the future of this field seems to be well assured."

A computer company needs capital to grow, especially if its customers wish to rent equipment. Xerox may have the capital, but its recent move to take over CIT Financial Corp. was interpreted as an attempt to gain working capital. There are also reports that Xerox is looking at some other companies in various portions of the computer industry. Perhaps Xerox is simply out to become a compuglomerate.



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## BURROUGHS STARTS DELIVERING COMPUTERS UNDER AIR FORCE PHASE II CONTRACT

Shortly over a year ago (EDP/IR Dec.29,1967), the Air Force selected Burroughs to fulfill the biggest computer contract ever let -- a group of 135 or more computers worth at least $60 million. Now, the Air Force has made its training and acceptance tests and has authorized Burroughs to begin delivery of B3500 computers to over 150 bases around the world.

These computers, implementing the USAF Phase II Base Level Data Automation Standardization Program, are supposed to automate Air Force management systems and procedures . . . providing logistics management at the base level. The systems are designed to handle on-line, real-time processing of programs that deal with civil engineering, accounting, finance, military personnel, and other standard Air Force applications. In addition, each system will have to handle programs unique to individual major air commands.

Five of the B3500s have already been delivered and have been used for training of military personnel and for preparing the software to be used with the other systems involved. Before Burroughs was given the go-ahead, these systems underwent an extensive, three-month evaluation at Langely AFB.

The Phase II program really marks a landmark in the computer industry's history (EDP/IR Jan.12, Apr.13, May 31, & July 14,1967). Originally, the contract was awarded to IBM in April of 1967, even though IBM's bid of $114 million was almost double the final $60 million bid by Burroughs. In announcing the original contract award, the Air Force said that only IBM's equipment had met the specifications. Honeywell and other mainframe manufacturers protested vigorously, and finally the General Accounting Office instructed the Air Force to review the award procedure.

To the surprise of many, Burroughs was selected after the original four bidding companies had undergone new benchmark tests and evaluations. Observers interpreted the selection of Burroughs to mean (1) that price competition can work in the computer industry, and (2) that a major standardization effort was not automatically locked into the selection of IBM.

Indeed, winning the Phase II contract was a big boost for Burroughs: The award added 34% to Burrough's backlog at the time it was received, and even now it represents about 15% of the company's record backlog. And with Burroughs off to a relatively slow start in installing third-generation equipment (EDP/IR July 31, 1968), deliveries under the contract will obviously help push its share of third-generation equipment up more in line with its 2.5% share of total installations.

The original Phase II contract called for 135 computers, and the final number to be delivered has not definitely been decided; at present, however, Burroughs is committed to deliver over 150 of the B3500s. Under this schedule, the company will build up its deliveries to a peak of 11 systems per month and will deliver the final system sometime around the middle of July, 1970. This delivery period may be extended somewhat if the Air Force decides to order more systems.

The Air Force, at present, plans to use these systems for about six years, even though initial deliveries are about a year later than originally planned. At present, all systems delivered under the contract are leased from Burroughs; the decision to purchase will be made when the new Government fiscal year starts in July, and will depend on the availability of funds under the final budget.



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## NEW REGISTRATIONS

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| AUTOCOMP INCORPROATED | Autocomp Incorporated, Suite 902, 4720 Montgomery Lane, Bethesda, Md., which develops computerized information systems, on Jan. 28 filed 200,000 common. The proceeds, at a price to be set by amendment (max. $10 per share), will be used for debt repayment and expansion. The underwriter will be Mason & Co., Inc., 2801 Washington Ave., Newport News, Virginia. |
| COMPUTER CENTER, INC. | Computer Center, Inc., 423 West Monument St., Baltimore, Md., a computer service company, on Jan. 28, filed 195,000 common. The proceeds, at a price to be set by amendment (max. $8 per share), will be used to lease time-sharing equipment and for other corporate purposes. The underwriter will be Abbott, Proctor & Paine, 830 East Main St., Richmond, Virginia. |
| COMPUTER DYNAMICS, INC. | Computer Dynamics, Inc., 1760 Solano Ave., Berkeley, Cal., which provides computer services and consultations, filed 142,850 shares of capital stock. The proceeds, at a price to be set by amendment ($8 per share max.), will be used to develop software, for marketing and for working capital. The underwriter will be Hambrecht & Quist, 2502 Russ Blvd., San Francisco. |
| COMPUTER TECHNOLOGY, INC. | Computer Technology, Inc., 65 East South Water, Chicago, Ill., which comprises several of LTV's computer operations, on Feb. 19 filed 689,500 of outstanding common stock. The present stock is owned 12% by LTV and 71% by LTV Aerospace. LTV proposes to sell all of its holdings. The underwriter will be Lehman Brothers, 1 William St., New York. |
| COORDINATED COMPUTER CONCEPTS, INC. | Coordinated Computer Concepts, Inc., 226 West 37th St., New York, a software company, on Jan. 27 filed 250,000 common. The proceeds, at a price of $1.50 per share, will be used for expansion and for working capital. The underwriter will be Sherwood Securities Corp., 51 Broadway, New York. |
| DATA LEASE FINANCIAL CORP. | Data Lease Financial Corp., 401 North Lake Blvd., North Palm Beach, Fla., a leasing company, on Jan. 28 filed $3,000,000 of 7% sub. conv. debentures due 1989, 111,000 shares of common and 75,000 common warrants, to be offered in units of a $1000 debenture, 37 shares and 25 warrants. The proceeds will be used for debt repayment and working capital. The underwriter will be Smith, Jackson & Co., Inc., 17 Battery Place, New York. |
| DATA RESEARCH CORP. | Data Research Corp., 2601 East Oakland Park Blvd., Ft. Lauderdale, Fla., which manufactures and sells digital instrumentation and direct digital control systems, on Feb. 7 filed 330,000 common. The proceeds, at a price of $3 per share, will be used for design, manufacturing and marketing costs. The underwriter will be Charles Plohn & Co., 200 Park Ave., New York. |



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| | |
|---|---|
| CGA COMPUTER ASSOCIATES, INC. | CGA Computer Associates, Inc., 725 Park Ave., East Orange, N.J., a software company, on Jan. 28 filed $200,000 of 6% sub. debentures, due 1979, and warrants to purchase 100,000 common shares, and 150,000 common. The debentures and warrants are to be offered in units of a $1000 debenture and 500 warrants at $1000 per unit. The common will be offered at $2 per share. The proceeds will be used for program development and for debt repayment. The underwriter will be Sterling Grace Securities Corp., 39 Broadway, N.Y. |
| INTERACTIVE LEARNING SYSTEMS, INC. | Interactive Learning Systems, Inc., 1616 Soldiers Field Rd., Boston, which develops and markets educational materials and related computer systems, on Feb. 5 filed 125,000 common. The proceeds, at a price of $10 per share, will be used for development and expansion. There will be no underwriter. |
| INTERNATIONAL TIMESHARING CORP. | International Timesharing Corp., 4620 W. 77th St., Minneapolis, Minn., a RAIR service bureau, on Feb. 19 filed 300,000 common. The proceeds, at a price to be set by amendment ($10 per share max.), will be used for expansion and software development. The underwriter will be Dain, Kalman & Quail, Inc., 110 S. 6th St., Minneapolis, Minn. |
| MEDEQUIP CORP. | Medequip Corp., 540 Frontage Road, Northfield, Ill., which will offer computer services to hospitals, on Jan. 30, filed 200,000 common. The proceeds, at a price of $10 per share, will be used for equipment, research and personnel. The underwriter will be D.H. Blair Securities Corp., 66 Beaver St., New York. |
| TIME BROKERS, INC. | Time Brokers, Inc., 380 Lexington Ave., New York, which engages in the brokerage of computer time, on Jan. 29 filed 90,000 common. The proceeds, at a price to be set by amendment (max. $6 per share), will be used for starting new offices. The underwriter will be Carter, Walker & Co., 115 Broadway, New York. |
| VIDEO SYSTEMS CORP. | Video Systems Corp., 7300 North Crescent Blvd., Pennsauken, N.J., which proposes to market an electronic inventory control and data retrieval system, on Jan. 30 filed 230,000 common. The proceeds, at a price of $5 per share, will be used for manufacturing and marketing. The underwriter will be L. Flomenhaft & Co., 76 Beaver St., New York. |
| VIDEOGRAPHIC SYSTEMS, INC. | Videographic Systems, Inc., 375 Kings Highway, Hauppage, LI, N.Y., which develops and applies computer technology to the printing industry, on Jan. 31 filed 300,000 common. The proceeds, at a price to be set by amendment ($12 max. per share), will be used for equipment and working capital. The underwriters will be White, Weld & Co., 20 Broad St., N.Y. and Faulkner, Dawkins & Sullivan Securities, Inc., 60 Broad St., N.Y. |
| WILKINSON COMPUTER SCIENCES, INC. | Wilkinson Computer Sciences, Inc., 200 Sweetwater Ave., Bedford, Mass., which proposes to develop, manufacture and market a small scientific control general purpose digital computer, on Feb. 14 filed 285,000 common. The proceeds, at a price of $10 per share, will be used to support operations while cash deficits continue. The underwriter will be S.D. Fuller & Co., Inc., 26 Broadway, N.Y. |



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January 27 - February 7, 1969

| | 1968-1969 High | 1968-1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 2502 | 70 3/4 | 67 | 70 | + 1 5/8 | + 2.38 |
| American R & D | 207 | 122 1/2 | 238 | 179 | 168 1/2 | 172 1/4 | - 7 3/4 | - 4.31 |
| Ampex Corp. | 42 3/8 | 26 1/2 | 1463 | 38 3/8 | 36 3/8 | 37 7/8 | + 1 3/8 | + 3.77 |
| Bunker Ramo | 21 3/8 | 15 | 9570 | 16 1/2 | 15 | 15 7/8 | - 1/2 | - 3.05 |
| Burroughs | 255 3/4 | 157 | 1085 | 240 | 229 7/8 | 238 3/4 | -- | -- |
| Collins Radio | 101 1/8 | 53 | 648 | 67 | 60 1/4 | 61 1/8 | - 4 7/8 | - 7.39 |
| Computer Sciences | 67 3/8 | 31 5/8 | 742 | 65 | 61 | 61 | - 3 3/4 | - 5.79 |
| Control Data | 163 1/2 | 124 1/4 | 2804 | 147 1/8 | 137 | 140 1/2 | - 5 3/4 | - 3.93 |
| Electronic Assoc. | 27 3/8 | 18 | 846 | 24 3/4 | 22 7/8 | 23 3/8 | - 1/4 | - 1.06 |
| General Electric | 100 3/8 | 80 1/4 | 3668 | 92 3/4 | 89 1/2 | 91 7/8 | + 1 1/4 | + 1.38 |
| Honeywell | 139 3/4 | 89 3/8 | 1055 | 122 1/4 | 115 3/8 | 119 1/4 | - 7/8 | - 0.73 |
| IBM | 375 | 294 1/2 | 2729 | 300 1/2 | 294 1/2 | 298 | - 1 3/4 | - 0.58 |
| ITT | 62 1/2 | 44 7/8 | 2654 | 55 3/8 | 52 1/4 | 54 | - 1 1/4 | - 2.26 |
| Litton | 104 3/4 | 59 1/2 | 8295 | 65 7/8 | 59 1/2 | 60 | - 5 | - 7.69 |
| Memorex | 93 1/2 | 61 1/2 | 2155 | 73 5/8 | 65 | 67 1/2 | - 3 1/2 | - 4.93 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 905 | 118 1/8 | 110 1/8 | 118 | + 6 | + 5.36 |
| RCA | 55 | 43 3/4 | 3676 | 45 | 43 3/4 | 44 3/8 | - 1/2 | - 1.11 |
| Raytheon | 54 | 33 1/4 | 1803 | 48 1/2 | 41 3/4 | 43 5/8 | - 4 7/8 | -10.05 |
| Sanders | 66 1/2 | 41 3/4 | 849 | 60 1/2 | 56 | 59 3/4 | + 1 1/4 | + 2.14 |
| Scientific Data | 117 1/2 | 79 3/4 | 3430 | 100 1/2 | 85 | 100 1/2 | +10 1/2 | +11.65 |
| SCM | 61 1/4 | 35 3/4 | 1542 | 46 3/8 | 43 1/4 | 44 3/4 | - 1 1/8 | - 2.45 |
| Singer | 88 7/8 | 62 3/4 | 839 | 82 7/8 | 78 5/8 | 82 5/8 | + 3 7/8 | + 4.92 |
| Sperry Rand | 63 3/8 | 41 3/8 | 4210 | 54 | 48 5/8 | 52 | + 2 3/4 | + 5.56 |
| Teledyne | 143 7/8 | 90 1/8 | 1261 | 104 3/4 | 97 1/4 | 102 1/2 | - 5/8 | - 6.06 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 0.57 | - 1.01 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic DP | 75 1/2 | 42 | 101 | 74 7/8 | 71 3/4 | 72 1/4 | - 3/4 | - 1.03 |
| Calcomp | 53 1/4 | 26 3/4 | 502 | 35 3/4 | 31 1/4 | 35 1/8 | + 2 5/8 | + 8.08 |
| Clary Corp. | 32 3/8 | 12 1/4 | 513 | 25 3/4 | 23 1/4 | 23 1/2 | - 2 1/8 | - 8.29 |
| Computer Applications | 42 5/8 | 17 5/8 | 335 | 19 7/8 | 18 1/2 | 18 1/2 | - 1 1/8 | - 5.73 |
| Computing and Software | 93 1/4 | 43 1/2 | 71 | 93 1/4 | 90 | 90 | - 1/4 | - 0.28 |
| Data Proc. Fin. & Gen. | 72 1/2 | 46 1/2 | 1153 | 56 1/2 | 50 | 51 1/2 | - 3 7/8 | - 6.99 |
| Data Products | 28 7/8 | 17 1/8 | 1970 | 24 1/2 | 21 | 23 1/4 | - 3/4 | - 3.13 |
| Digital Equipment | 179 | 95 1/4 | 332 | 170 | 158 | 163 1/2 | - 6 1/2 | - 3.83 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 1208 | 36 3/4 | 28 | 33 3/8 | + 4 7/8 | + 1.71 |
| Granite Computer | 58 7/8 | 35 1/2 | 466 | 45 1/2 | 39 1/4 | 39 5/8 | - 3 7/8 | - 8.91 |
| Greyhound Computer | 43 1/4 | 25 | 336 | 28 | 25 5/8 | 26 | - 1 1/2 | - 5.45 |
| Leasco | 143 | 70 3/4 | 1954 | 143 | 132 1/4 | 133 | - 4 3/8 | - 3.18 |
| Levin-Townsend Comp. | 67 3/4 | 47 5/8 | 974 | 55 1/2 | 51 1/4 | 51 3/8 | - 1 1/8 | - 2.14 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 648 | 34 1/2 | 29 1/8 | 33 3/8 | + 7/8 | + 2.69 |
| Mohawk Data Sciences | 107 1/2 | 58 | 1640 | 67 | 62 | 66 | -- | -- |
| Planning Research | 29 3/4 | 25 3/4 | 389 | 29 3/4 | 27 3/4 | 28 3/8 | + 3/8 | + 1.34 |
| Potter Instrument | 38 1/2 | 20 1/2 | 1120 | 35 3/4 | 32 5/8 | 34 1/4 | + 1 1/8 | + 3.40 |
| Randolph Computers | 64 | 34 5/8 | 1216 | 43 7/8 | 39 3/4 | 40 1/4 | - 2 1/2 | - 5.85 |
| Systems Eng. Labs. | 42 5/8 | 26 5/8 | 606 | 29 7/8 | 26 5/8 | 28 3/4 | - 7/8 | - 2.95 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 0.78 | - 2.13 |

| | 1968-1969 High Bid | 1968-1969 Low Bid | February 7 Bid | February 7 Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 | 14 1/2 | 35 | 37 | 34 | + 1 | + 2.94 |
| Aries Corp. | 24 | 12 1/2 | 16 | 17 1/2 | 19 | - 3 | -15.79 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 17 3/4 | 18 3/4 | 18 | - 1/4 | - 1.39 |
| Computer Usage | 62 | 23 1/2 | 36 | 38 | 38 | - 2 | - 5.26 |
| Cyber-tronics | 19 | 10 1/2 | 11 | 11 1/2 | 10 7/8 | + 1/8 | + 1.15 |
| Digitronics | 27 1/2 | 16 1/2 | 19 1/2 | 20 1/2 | 20 | - 1/2 | - 2.50 |
| DPA, Inc. | 20 3/8 | 11 3/4 | 13 1/4 | 13 5/8 | 13 5/8 | - 3/8 | - 2.75 |
| Electronic Memories | 67 | 32 3/4 | 54 3/4 | 55 3/4 | 57 | - 2 1/4 | - 3.95 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 11 5/8 | 12 1/8 | 12 3/8 | - 3/4 | - 6.06 |
| Informatics, Inc. | 34 | 16 | 24 3/4 | ** | 26 3/4 | - 2 | - 7.48 |
| LMC Data, Inc. | 16 | 6 1/2 | 7 1/4 | 7 3/4 | 7 3/4 | - 1/2 | - 6.45 |
| Management Assistance | 16 3/4 | 9 1/4 | 12 7/8 | 13 1/8 | 14 5/8 | - 1 3/4 | -11.97 |
| Optical Scanning Corp. | 145 | 71 | 108 | 112 | 114 | - 6 | - 5.26 |
| Recognition Equipment, Inc. | 101 | 38 1/2 | 69 | 71 | 67 | + 2 | + 2.97 |
| Tally Corp. | 51 1/2 | 30 | 33 | 35 | 33 1/2 | - 1/2 | - 1.49 |
| TBS Computer Centers Corp. | 21 3/4 | 10 1/2 | 14 1/4 | 15 | 13 | + 1 1/4 | + 9.62 |
| University Computing | 185 | 57 | 130 | 134 | 149 | -19 | -12.75 |



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REVIEW AND FORECAST

E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 25,1969 • VOL.4,NO.14 P.J.McGOVERN,EDITOR

A very interim year

## 1968 COMPUTER SHIPMENTS EXCEED EXPECTATIONS; EDP INDUSTRY FACES NEW GROUNDRULES IN 1969

With almost predictable disregard for previous forecasts, 1968 turned out to be a better year than expected for the computer industry. Indeed, total shipments worldwide, up some 22%, were better than anticipated even at midyear (EDP/IR July 31,1968), yet, as we pointed out at that time, the industry seems to be settling down to its normal, long-range explosive growth rate. Unlike other years for the computer industry, however, 1968 ended with more than just superlatives; as 1969 gets started, it's clear that there are significant transitions occuring in the EDP market. Here are highlights from the year just past:

- Shipments of new computer equipment, by American manufacturers, jumped to $7.2 billion, a healthy 22% increase over last year's impressive $5.9 billion. The rate of growth, indeed, slowed down . . . but not so much as anticipated a year ago.

- Although dollar value of worldwide shipments was up more than anticipated, the number of computer systems shipped actually decreased. It was down 21.4% to 14,700. Reasons for this are: (1) substantial deliveries of large systems announced several years ago but just now moving off the shipping docks; (2) significant amounts of add-on equipment (up to 40% of total shipments for some companies) for expansion of existing installations; and (3) massive replacements of second-generation computers with fewer third-generation models.

- The total computer industry -- including special-purpose computers, software, computing services, and supplies as well as general-purpose digital systems -- reached the $11.3 billion level. Unlike the situation in previous years, this total figure increased by approximately the same percentage as did computer systems alone, suggesting the tightening links between different sections of the market that led EDP/IR to suggest last year that 1968 would be the year of synergism, with independent industry segments interacting for added effect.

- The role of purchases by third-party leasing companies was even more significant during 1968 than previously. The more than $1 billion worth of computers purchased from IBM, in fact, accounted for such a boost in IBM's profit levels that the company may not be able to sustain the same rate during 1969.

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- Minicomputers and time sharing came into their own. At the spring and fall joint computer conferences, minicomputers, remote terminals, and new on-line services were being announced all over the place.

- As 1968 ended and 1969 began, the industry knew it should begin to look at itself and at its business in the light of a whole new set of guidelines. IBM announced that during the first part of 1969 it would announce a new pricing structure for its equipment and services; then . . . zapp! bang! poww! . . . Control Data, DPF&G (the leasing company) and the Justice Department filed antitrust suits against IBM.

- Retirements of installed computer systems shot up sharply in 1968. During the year, the value of installed American-made computers increased $5.6 billion net, with the other $1.6 billion of shipments cancelled by equipment returned from the marketplace. This 29% retirements/shipments ratio is up significantly from the 9% reflected in last year's figures.

The trends that were started during 1968 -- especially the litigation that was introduced and the separate pricing it implies -- mean that the industry faces the next several years in an atmosphere of uncertainty. Industry growth will not change significantly because of the new rules, but the structure of the industry may very well indeed. For this reason, we have had to treat our forecasts in a different light.

SHIPMENTS, BY MANUFACTURER, IN 1968

All of the major mainframe manufacturers had increases in the value of computer shipments last year, though three in particular explain much of what happened. CDC, with a 53% gain in shipments over 1967, illustrates the importance of large computers in last year's shipments. IBM with a 21% increase, just below the industry average, had significantly increased add-on as well as an increase in shipments of large computers. Honeywell, with a smaller increase, had well over one-third of its new business in add-on. The table below -- based on estimates by the International Data Corporation, publisher of EDP/IR -- contains estimates of computer shipments by principal American computer manufacturers during 1968. The figures reflect worldwide shipments of newly produced computer systems as well as new core memory and peripheral equipment added-on to existing systems; they do not include replaced equipment refurbished and shipped to new customers.

| Company | Shipments in $ millions | Percentage |
|---|---|---|
| International Business Machines | $5200 | 72.2% |
| Univac | 380 | 5.3 |
| Honeywell | 340 | 4.7 |
| Control Data Corporation | 305 | 4.2 |
| General Electric | 280 | 3.9 |
| Radio Corporation of America | 225 | 3.1 |
| Burroughs | 170 | 2.4 |
| National Cash Register | 170 | 2.4 |
| Scientific Data Systems | 75 | 1.0 |
| Digital Equipment Corporation | 35 | 0.5 |
| Others | 20 | 0.3 |
| | $7200 | 100.0 |



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## OUTLOOK FOR THE COMPUTER INDUSTRY

There are many and varied reasons for the relative success of each of the ten major computer manufacturers during 1968, and each of them has both strengths and weaknesses as it faces 1969 and the 1970s. It must be remembered, however, that IBM has shipment levels that range from 10 to over 100 times those of its competitors. As a result, the moves made by IBM play an important role in setting the environment within which other manufacturers create their opportunities. To give perspective to the current outlook, EDP/IR will first review IBM, the major force in the industry. We will then give our review and outlook for each of the other leading manufacturers of electronic data processing equipment.

### The role and outlook of IBM in the industry

A computer industry outlook always depends crucially on the outlook for IBM. But in looking ahead toward 1969 and the early 1970s, the directions that IBM may follow take on increasing importance. There are two key reasons for this:

- The year 1969 marks the fifth anniversary of the announcement of IBM's System/360 -- as well as many other "third-generation" computers -- and if "traditional" considerations of a five-year product cycle for computer generations were to be followed, this year would see many product announcements. The introduction of major new systems in 1969 is unlikely, however, so there will be a break in the historical pattern of computer generations in the industry.

- During late 1968, IBM -- almost as if it knew what was coming -- announced that by mid-1969 it would publish new policies on its pricing of computer products and services. Then, only a few days later, came the first of three law suits whose settlements -- if nothing else -- will define the nature of the computer industry through the 1970s and into the 1980s . . . perhaps into an age of maturity and tradition.

With the uncertainty of the outcome of these, it is difficult to make projections. Therefore, EDP/IR's forecast for specific manufacturers -- and for the industry -- is made on the premise that current marketing policies will continue. Indeed, this will likely be the situation for the next three to six or more years, and the outlook for mainframe manufacturers will be affected far less by changes than will that of the other companies within the computer industry. These will be discussed later.

### Separate pricing, of some sort, is almost certain

In looking ahead, it seems almost a certainty that the industry will see some form of separate pricing. IBM currently is weighing the extent to which it wants -- or needs -- to anticipate the requirements that almost certainly would be contained in a consent decree . . . the outcome of the Justice suit expected by EDP/IR and industry experts to whom we have talked. IBM will probably introduce a modified plan that, among other things, will enable it to gage the attitude and response of the computer user himself. (EDP/IR currently is conducting a survey on this matter, and will report it in the next issue.)

Whatever is done in the immediate future -- indeed, whatever is done in the long range -- it is EDP/IR's opinion that IBM will almost certainly not lose, and that it will probably gain. We also think that -- with the possible exception of



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the independent software companies which may gain increased opportunities -- other segments of the computer industry will experience either no, or a negative effect. And we feel certain that the computer user will end up spending as much or more than he does today for equivalent computer services.

In the interim, what?

During 1969 and the early 1970s, EDP/IR expects IBM to continue business as usual . . . implementing the changes it already had planned. Items to look for stack up as follows:

- Pricing -- IBM likely, this spring, will announce a modified pricing structure that will start to break out customer costs for hardware, software, custom customer support, education, maintenance, and the like. A few of its customers -- perhaps as many as 20% -- may take advantage of independent sources for portions of their support.

- New Products -- As pointed out in the last issue, the "3.7's" introduction is imminent. This terminal-type computer will primarily impact punched-card equipment users and, in addition, will be a valuable add-on consideration for organizations with large computer systems. In addition, after the pricing announcement, IBM is expected to announce the 360/35 and 360/45. These transition generation machines will give new, communications-oriented growth possibilities to present-day 360/30 and 360/40 users. Several products must be expected, since most 360s are on a "limited new production" basis, and the larger 360/50s and 360/65s have a firm 18 month delivery schedule. IBM's industrial machine must be kept oiled and running, lest it rust.

- Growth -- Following the tremendous increase in -- and inherent spurt in profits from -- purchases of computers by third-party leasing companies during 1968, IBM may well follow through its prediction for declines in profits -- or profit growth -- for 1969. In the words of one industry observer: "This may be the year for IBM to get the air bubble out of its gas line" . . . and tool up for the early 1970s.

IBM's outlook

All in all, as the accompanying tables show, EDP/IR is projecting only a 15% growth in industry shipments for 1969. And if Burroughs, NCR, and other companies experience the shipment growth their backlogs would indicate, IBM could well see a year of shipment growth in the 12% area. There is only one drawback: IBM is virtually committed to a 15% to 17% profit growth, so a corresponding shipment growth is indicated. Several production lines have been curtailed for several months, and it could be that when IBM announces its new products it will demonstrate them as well . . . and announce that they will have very short delivery schedules.

Individual outlook for 1969, by manufacturer

With the general outlook for IBM, and therefore for the industry, in mind, we present in the following section our individual outlooks for the other major manufacturers that -- along with IBM -- constitute the mainframe sector of the computer industry:



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Burroughs. According to the numbers, things are looking very well. Burroughs had the largest percentage growth in shipments of any manufacturer, and at yearend, its on-order position was exceeded only by those of IBM and Univac. This is factual proof of the general industry feeling that this company's success is based on a well-developed and supported product line. The delivery of effective software on a timely basis has contributed a lot to the success of the 500 series. Users report very efficient higher-level languages and better throughput than on many competitive models.

On the lower side of this series, the B3500 has been accepted for delivery under the Air Force Phase II contract, and this "vote of confidence" shouldn't be harmful to Burroughs salesmen. At the upper end of the line, the B6500 and B7500 seem to be getting quite good acceptance, especially as B5500 users want to upgrade this computer upon which the series is built. Only the superscale B8500 -- as it was a year ago -- is still a question mark. The company says it intends to make the computer a reality, but customers are losing faith and we can only wait and see. Perhaps it will be "fixed" by the time B6500 and B7500 customers need to upgrade.

At the terminal level -- a rapidly growing portion of the computer equipment market -- Burroughs seems to be sitting pretty. The acceptance of the TC-500 is good, and volume deliveries should begin this year. Also, Burroughs seems to be testing the air for the prospect of separate pricing. In introducing the L2000 accounting "computer," the company announced that software would be priced separately from hardware. It would appear that Burroughs is getting ready and field testing what seems the inevitable . . . separate pricing of hardware and software. At least it will have some understanding of what customers think of the concept.

Control Data. Considering the merger with Commercial Credit Corp., the acceptance and continued delivery of the 6000 series, the "unveiling" and first delivery of the superscale 7600, and the establishment of Cybernet on-line computing service, CDC obviously had a good year. In addition, it was the first of the three parties to bring antitrust action against IBM. In a nutshell, the news from Minneapolis is good. CDC is no longer "the only major manufacturer so heavily dependent on computers for revenue," as we described it last year. Also, it now has the "bank" so necessary to success in the computer business.

In the hardware area, the company continues to be a major supplier of computer peripheral equipment and terminals, and therefore has a large OEM market. Also, although competition has increased during the last year, it is still a major supplier of disk packs for its own and for IBM drives. CDC is having a brisk market for its extended core memories for its 6000 series machines; and it is expected to introduce, soon, a radically new "chain type" line printer. There may be problems in moving the 7600 to a production line basis, but since the computer is made from mass-produced modules, these should not be too great. And, plans are well along for using these modules in a whole new line of peripheral computers for the mid 1970s.

With the additional capital available through Commercial Credit, CDC can be expected to move more rapidly into business-oriented data processing. Much of this growth could come through its Cybernet, which is currently promoting the use of CDC remote batch terminals as "windows into the 6600." The sales force expects that some Cybernet customers will gradually find it more economical to install their own 6000 series computer.

Digital Equipment Corp. "The minicomputer market is booming, and DEC is the giant." That's what we said a year ago, and no more accurate phrase could sum up the out-look for DEC again this year. Shipments of minicomputers -- those



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general-purpose digital computers that sell for $25,000 or less -- should double again during 1969 to over $100 million; and despite the many new companies that have entered this field, DEC is expected to maintain its position in this sub-market similar to that of IBM in the total market.

In addition, Digital is making inroads into the time-sharing market with its PDP-10, a computer currently being delivered at rates of three or four a month. Also, the company is looking upon the minicomputer as more than just a processor. It is developing specialized applications packages to give it entree into new industries, and is working hard toward producing a complete line of miniperipherals, devices that not only will make minicomputers more effective but also that will increase the average value of a system at a time when central processor costs are plummeting.

General Electric. Thanks largely to deliveries abroad -- which are greater now than those in the U.S. -- GE showed a 17% increase in shipments, nearly up to the industry average, last year. And with the exception of the Olivetti-developed 115, almost all these shipments were of machines that have been around for several years. GE should be one of the first companies to introduce a major new line of computers, and a management change late in 1968 seems oriented in this direction.

So far, GE has continued its lead in time sharing, and continues to expand both in the U.S. and abroad. It currently has about 40% of this country's computational time-sharing business, and an even greater share abroad. Its leadership here, however, is threatened by at least three factors: 1) GE's 265 equipment is old and inefficient in its use of mass memory; therefore it may be the first service to suffer from price competition. The Mark II service, operating from 635 computers, gives GE a third-generation entry into this market, however. 2) There is a trend toward the use of on-line computer networks to sell specialized programs and data bases . . . GE was one of the first companies, in fact, to recognize this and adjust prices accordingly. But there is some question that GE, with its sales force and older equipment, can take full advantage of this trend. 3) More and more computer users are realizing the increased amounts they are paying for computational time sharing and are purchasing small, dedicated systems for in-house use. To offset this trend, we understand, GE is developing a new small-scale time-sharing product line.

Over all, there continues to be the question of whether or not GE understands the computer business. It is committed to it, and will be in for the long haul . . . in one way or another. But, it seems, each time it recognizes the need to bring computer industry people into management, and obtains them, it turns around and gives higher level control to old-line company men. Despite the management changes made recently, it still will be very interesting to see whether GE can successfully apply traditional business management principles to the computer industry.

Honeywell. Despite the fact that it had the smallest increase in shipments last year (6%), Honeywell may well be the nearest thing there is to The Other Computer Company, as it describes itself in its current advertising series. It has the second largest base of general-purpose, third-generation computer systems, and during the last year or so it has added many of the features that contribute to a total systems capability. Last year it introduced a line of disk packs and drives, introduced the Keytape; early this year, it has introduced a time-sharing computer, started deliveries of medium-to-large-scale computers, announced a time-sharing and service bureau network, brought out its first minicomputer, and hinted at plans for going into software and education.



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Honeywell's equipment, on the other hand, is the oldest of the third-generation families -- with the H200 announced more than five years ago -- and there is certainly much development work being done toward its next series of computers. But the 200 series continues to move, and the more than $1 billion worth of third-generation equipment currently installed represents a valuable base for add-on sales each year. Honeywell is profitable in its computer operations, and perhaps its reduced new system shipments this year represents a plan to insure that the profits from this base are realized.

For these reasons, Honeywell is not expected to announce a complete new family of computers, although a transition model or two may well be expected. Emphasis by the company's Computer and Communications Division will be to continue add-on sales, to bring new users into its fold, to increase its activities in the supplies and peripherals fields, to venture into the minicomputer market, to establish its Information Services Div. (within which its time-sharing centers operate), and to move ahead in the terminal area. Its new line equipment -- expected to be program compatible with the IBM System/360 computers and microprogram compatible with the Series 200 machines -- will, however, probably be the first announced by a major manufacturer . . . announcement is not expected before 1970, and because of recent internal delays, will probably not come before 1971.

National Cash Register. As predicted, the Century Series (see the 615) was the most thoroughly prepared-for announcement of the 1960s, and initial acceptance would indicate that this transition generation machine will equal or surpass the company's initial predictions. The company's yearend backlog is above the value of its 1968 shipments. Industry observers concede that NCR has latched onto an attractive product line giving basic yet capable service to smaller organizations, and they expect continued success for this manufacturer.

To supply customers with a full line of computer system equipment, NCR has chosen the route of offering peripherals, terminals, and software from other sources. The apparent philosophy is that only so much capital can be committed, and when the best in this area cannot be developed in-house, it is better to select the desired product from an outside supplier. With NCR already committing so much of its resources to support of the Century, this may well prove to be the most practical method.

RCA. With a shipment increase of 29%, RCA continues to stay abreast, or slightly ahead, of the industry in general and steadily to build the base for a profitable computer business in the 1970s. It has limited objectives in the marketplace until 1971-1972, although the Spectra series of machines are being well accepted in a communications environment.

For the mid-1970s, RCA's computer line is expected to be heavily composed of software-in-hardware components (as is IBM's) and is seen to be oriented toward time sharing and other on-line computer applications. RCA is also making strong commitments to the area of computer applications in the education and the graphic art field.

SDS. With shipments up 42% last year, SDS has finally captured one percent of the computer market. Its 940 computer is one of the standard machines used by time-sharing services, and it looks as if its Sigma 7 will be an adequate entry into communications-oriented markets. These facts, however, are relatively unimportant in light of the impending merger of SDS with Xerox.

SDS already has the goal of bringing its product to the commercial field, rather than to the specialized user. And there is talk that Xerox plans a diversified computer service to compliment its office and business systems



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capability. Other mergers are being talked about. By this time next year (if not before), we look forward to discussing the role of Xerox in the computer industry.

Univac. Ranked number two company in terms of value of installed computers or of shipments, Univac still presents its traditional face . . . but there is good evidence that the face is changing. Shipments of the 1108 -- the computer that by chance or design has become almost a standard in the large-scale scientific market -- continue to be impressive, and as a result total shipments were up 12% last year. The general analysis of Univac is that it has excellent engineering but that its weakest link is in the area of sales and customer support . . . especially in the small-scale area to which the 9000 series machines are oriented.

There is a chance that a change in these traditional criticisms is on the horizon. There has been a sharp improvement in management. Also, this portion of Sperry Rand has shown signs of branching out: It seems to be spreading its operating base through the establishment of on-line service bureaus and the addition of more peripheral equipment to its product line.

Univac's orders in the large machine category are up significantly, and offset a reduced percentage of those in the small class, which have dropped to less than one-third of on-order business, and in the medium class, which is virtually nonexistent. One new product on the horizon is the 1106, a computer that is completely compatible with the 1108 and that offers about two-thirds the capability at about one-half the price. This, with a new series of terminal computers based on the D-2000, could well spell out Univac's product line during the next few years.

## A HISTORY, PROJECTION, AND ANALYSIS OF THE COMPUTER INDUSTRY THROUGH 1975

With the computer industry at perhaps its first "critical point," EDP/IR has changed, slightly, the manner in which it makes its projections. In most cases, we have kept the historical format -- as used in previous Review and Forecast issure -- and projected in a similar manner through 1970; in others, we have changed the definition of the various submarkets, and have adjusted our historical figures to more nearly reflect the new definitions.

During the past year, and especially since yearend, we have undergone an extensive updating of our continuing computer industry study that measures the current and expected annual sized of the principal sectors of the industry. This year, we have enlarged our sector analysis from five to six, and slightly redefined some of them. The six principal sectors now included (Table I) are: (1) General-purpose digital computers, (2) Special-purpose computers, (3) Independent peripheral equipment, (4) Contract and packaged software, (5) Computing and data processing services, and (6) Data processing supplies. Below is a discussion of each of these sectors and the type of companies that participate in each:

General-purpose digital computers, the mainstream of the computer industry, includes the ten major manufacturers discussed previously plus such companies as Standard Computers and Systems Engineering Laboratories that contribute to the output of general-purpose computers valued above $25,000. This is the major segment of the computer industry.

Special-purpose computers includes leading manufacturers of analog and digital computers generally used in special-purpose systems, such as in military guidance systems. Also included in this category are manu-



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TABLE I ESTIMATED AND PROJECTED ANNUAL VALUE OF COMPUTER EQUIPMENT SHIPPED BY AMERICAN MANUFACTURERS AND THE ANNUAL SIZE OF THE RELATED PERIPHERAL EQUIPMENT, SOFTWARE, AND SERVICES MARKET
(Values in $Millions; Equipment values calculated as purchase price of systems when shipped)

| Year | General Purpose Digital Computers | Special Purpose Computers | Independent* Peripheral Equipment | Contract and Packaged Software | Computing and Data Processing Services | Data Processing Supplies | Total |
|---|---|---|---|---|---|---|---|
| 1955 | $ 75 | $ 80 | $ 14 | $ 15 | | $ 155 | $ 339 |
| 1956 | 140 | 210 | 25 | 20 | | 175 | 570 |
| 1957 | 240 | 350 | 35 | 25 | | 195 | 845 |
| 1958 | 460 | 450 | 50 | 40 | | 230 | 1230 |
| 1959 | 600 | 650 | 75 | 90 | | 270 | 1685 |
| 1960 | 720 | 900 | 105 | 125 | | 370 | 2220 |
| 1961 | 1100 | 1100 | 110 | 180 | | 485 | 2975 |
| 1962 | 1400 | 1300 | 130 | 220 | | 530 | 3580 |
| 1963 | 1800 | 1300 | 145 | $ 5 | $ 265 | 595 | 4110 |
| 1964 | 2200 | 1200 | 170 | 20 | 300 | 630 | 4520 |
| 1965 | 2400 | 1250 | 175 | 50 | 400 | 660 | 4935 |
| 1966 | 3660 | 1400 | 185 | 100 | 500 | 740 | 6585 |
| 1967 | 5900 | 1610 | 225 | 175 | 600 | 850 | 9360 |
| 1968 | 7200 | 1850 | 300 | 270 | 720 | 960 | 11,300 |
| 1969 | 8200-8400 | 2050-2150 | 375- 425 | 350- 450 | 800- 900 | 1050-1150 | 12,825-13,475 |
| 1971 | 10,500-11,100 | 2400-2600 | 625- 725 | 600- 800 | 1000-1200 | 1200-1350 | 16,325-17,775 |
| 1973 | 14,900-15,900 | 3000-3200 | 900-1100 | 1000-1200 | 1350-1650 | 1300-1500 | 22,450-24,550 |
| 1975 | 19,400-20,400 | 3850-4150 | 1400-1600 | 1500-2000 | 1800-2200 | 1500-1700 | 29,450-32,050 |

* Part of this equipment is sold to computer manufacturers.

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TABLE II WORLDWIDE ANALYSIS OF GENERAL-PURPOSE DIGITAL COMPUTERS MADE BY U.S. FIRMS
(Values, in $Millions, calculated as purchase price of systems when shipped)

| Year | No. of Systems Shipped | Cumulative Net Systems Installed (Yearend) | Value of Computer Equipment Shipped | Cumulative Net Value Installed (Yearend) | Cumulative Customer Installation Sites (Yearend) |
|---|---|---|---|---|---|
| 1955 | 150 | 250 | $ 65 | $ 180 | 190 |
| 1956 | 600 | 800 | 170 | 340 | 575 |
| 1957 | 1000 | 1700 | 280 | 600 | 1100 |
| 1958 | 1400 | 2950 | 460 | 1035 | 1900 |
| 1959 | 1700 | 4500 | 600 | 1600 | 2900 |
| 1960 | 2200 | 6500 | 720 | 2265 | 4000 |
| 1961 | 3400 | 9300 | 1100 | 3265 | 5400 |
| 1962 | 4500 | 12,600 | 1400 | 4515 | 7400 |
| 1963 | 5600 | 16,800 | 1710 | 5975 | 9600 |
| 1964 | 7500 | 24,000 | 2200 | 7925 | 14,000 |
| 1965 | 7400 | 31,000 | 2400 | 10,100 | 17,000 |
| 1966 | 10,200 | 40,600 | 3660 | 13,500 | 22,000 |
| 1967 | 18,700 | 57,600 | 5900 | 18,900 | 27,000 |
| 1968 | 14,700 | 69,400 | 7200 | 24,500 | 32,000 |
| 1969 | 15,000-15,800 | 79,500-81,000 | 8200-8400 | 30,500-31,500 | 37,500-38,500 |
| 1970 | 17,400-18,400 | 92,000-94,000 | 9150-9450 | 37,500-39,000 | 43,500-45,000 |

facturers of minicomputers (those that sell below $25,000) and analog computers. By 1975, this type of equipment will tend to be the same as that used in general-purpose systems, but with specific micrologic elements that optimize it for a particular application area. Also, it should be noted that minicomputers, although general-purpose in nature, will increasingly be used to take over special-purpose duties for general-purpose systems, such as communications handling. The low unit cost of minicomputers will tend to reduce the average system value of computers included in this category.

Independent peripheral equipment includes leading manufacturers of all the peripheral equipment used with computers. Examples are paper tape and punched card handling equipment, magnetic tape transports, disk pack drives, mass storage units, core memories, high-speed printers, graphic displays, data transmission units, and on-line terminals. The latter is one of the fastest growing of the computer industry submarkets, and the easiest entered by "outsiders," since the common communications line interface to the terminal provides independence from system control by the mainframe manufacturer.

Contract and packages software, a new category in this year's forecast, includes the companies that supply programming services or software to computer manufacturers and users, firms offering software packages for sale, and consulting services that essentially develop software for clients. Already, there is a hazy difference between firms that offer these services and the companies that offer specialized Rair (remote access/immediate response) services over communications networks.

Computing and data processing services includes firms that offer computing on a service bureau basis, those that provide remote batch processing, and those that offer Rair or time-sharing services.



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TABLE III GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED WITHIN THE U.S.
(Values, in $ Millions, calculated as purchase price of systems when shipped)

| Year | No. of Systems Shipped | Cumulative Net Systems Installed (Yearend) | Value of Computer Equipment Shipped | Cumulative Net Value Installed (Yearend) | Cumulative Customer Installation Sites (Yearend) |
|---|---|---|---|---|---|
| 1955 | 145 | 244 | $ 63 | $ 177 | $ 185 |
| 1956 | 550 | 746 | 156 | 324 | 533 |
| 1957 | 850 | 1500 | 240 | 547 | 930 |
| 1958 | 1180 | 2550 | 395 | 923 | 1575 |
| 1959 | 1395 | 3810 | 495 | 1390 | 2380 |
| 1960 | 1790 | 5400 | 590 | 1937 | 3210 |
| 1961 | 2700 | 7550 | 880 | 2715 | 4195 |
| 1962 | 3470 | 9900 | 1090 | 3620 | 5590 |
| 1963 | 4200 | 12,850 | 1300 | 4720 | 7050 |
| 1964 | 5600 | 18,200 | 1670 | 6105 | 9875 |
| 1965 | 5350 | 23,200 | 1770 | 7655 | 12,275 |
| 1966 | 7250 | 29,800 | 2640 | 10,030 | 15,650 |
| 1967 | 11,200 | 40,100 | 3900 | 13,600 | 18,400 |
| 1968 | 9100 | 47,100 | 4800 | 17,350 | 20,400 |
| 1969 | 9100-9800 | 53,000-54,000 | 5270-5370 | 21,100-21,850 | 22,500-23,300 |
| 1970 | 10,500-11,200 | 60,300-61,800 | 5700-5850 | 25,200-26,300 | 25,000-26,200 |

Data processing supplies includes companies that sell expendable data processing supplies such as paper tape, punched cards, magnetic tape, business forms, disk packs, and the like. This sector also includes such emerging supply areas as microfilm when it is used for output in a computer system.

## Explanation of tables

The results of our new computer industry analysis are shown in Tables I - V. Table I shows our estimates of the annual market sizes of the six principal sectors of the computer industry between 1955 and 1968, and our projections of the annual market size of each during the period from 1969 through 1975.

In Table II, we show the estimated and expected number of computer systems shipped each year by the American-based computer manufacturers. The value of these shipments is calculated for comparison. For each year in the study we have presented our estimate of the net cumulative number and value of American-made systems installed throughout the world. Also, to emphasize the changing character of the computer marketplace, we have indicated the number of customer sites at which these computers are used.

In Tables III and IV, we have broken down the information from Table II into its domestic and foreign segments. The differences in the two illustrate the past and expected future changing character of the two markets.

Because of the changing character of computer systems, and of what can be actually classified as a computer, we have looked at the future -- in Table V -- in terms of dollar value and the distribution of this value between the U.S. and abroad. In making estimates beyond 1970, we do not feel it is meaningful to estimate the "number of systems" shipped or installed, since redistribution of computer power to terminals and large complexes makes number counting a semantic exercise.



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TABLE IV GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED OUTSIDE THE U.S.
(Values, in $ Millions, calculated as purchase price of systems when shipped)

| Year | No. of Systems Shipped | Cumulative Net Systems Installed (Yearend) | Value of Computer Equipment Shipped | Cumulative Net Value Installed (Yearend) | Cumulative Customer Installation Sites (Yearend) |
|---|---|---|---|---|---|
| 1955 | 5 | 6 | $ 2 | $ 3 | 5 |
| 1956 | 50 | 54 | 14 | 16 | 42 |
| 1957 | 150 | 200 | 40 | 53 | 170 |
| 1958 | 220 | 400 | 65 | 112 | 325 |
| 1959 | 305 | 690 | 105 | 210 | 520 |
| 1960 | 410 | 1100 | 130 | 328 | 790 |
| 1961 | 700 | 1750 | 220 | 550 | 1205 |
| 1962 | 1030 | 2700 | 310 | 895 | 1810 |
| 1963 | 1400 | 3950 | 410 | 1255 | 2550 |
| 1964 | 1900 | 5800 | 530 | 1820 | 3625 |
| 1965 | 2050 | 7800 | 630 | 2445 | 4725 |
| 1966 | 2950 | 10,800 | 1020 | 3470 | 6350 |
| 1967 | 7500 | 17,500 | 2000 | 5300 | 8600 |
| 1968 | 5600 | 22,300 | 2400 | 7150 | 11,600 |
| 1969 | 5800-6000 | 26,200-27,200 | 2930-3030 | 9400-9650 | 14,800-15,400 |
| 1970 | 6900-7400 | 31,200-33,200 | 3450-3600 | 12,300-12,700 | 18,300-19,300 |

## Computer systems during the next five years

This redistribution of computer power is evident in the accompanying bar charts. Both these show percentage distribution based on cumulative net value of computer equipment installed (Chart I) or worldwide new computer system shipments by American manufacturers (Chart II). Naturally, therefore, the base for each succeeding year is larger than previous ones.

Chart I shows the distribution of installed computers by size, based on rental prices. At the end of 1967, more than half the computers installed (by value) were in Class II -- the medium-priced computer such as the 360/30, the H-200, or the B-300. The rapid growth in large-scale computers is quite evident, as is the growth in small computers. These small computers may often be used as terminals to complexes of large or super-scale computers.

Chart II shows how each $1000 of computer rental is expected to be distributed among the four major types of equipment that are found in a computer system -- central processors (logic and main memory); CPU-coupled input/output devices (such as card reader/punches, line printers, optical character recognition equipment, or console typewriters); external memory units (such as magnetic tape drives, disk pack drives, drums, or bulk core storage); and remote terminals (such as teletypewriters, cathode ray tube displays, or remote card or paper tape readers).

The shifting patterns of growth in the computer industry are most apparent from Chart II. The value of the central processor in the total system is continually declining, as is that of the input/output equipment attached to it. The portion of external memory in a system is expected to increase slightly over the next five years, and could grow even more by the mid-1970s if certain techniques now being tried in the laboratories can be brought to commercial status. The last set of bar graphs in this projection of hardware in the computer industry show the area in which the greatest growth is expected -- remote terminals.



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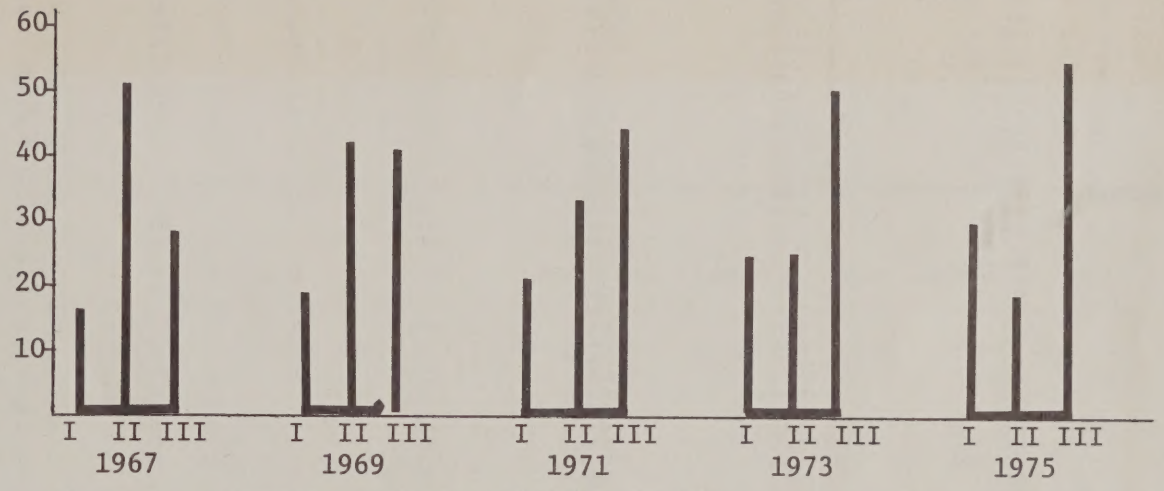
TABLE V FUTURE DISTRIBUTION OF GENERAL-PURPOSE DIGITAL COMPUTERS MADE BY U.S. FIRMS
(Values, in $ Millions, calculated as purchase price of systems when shipped)

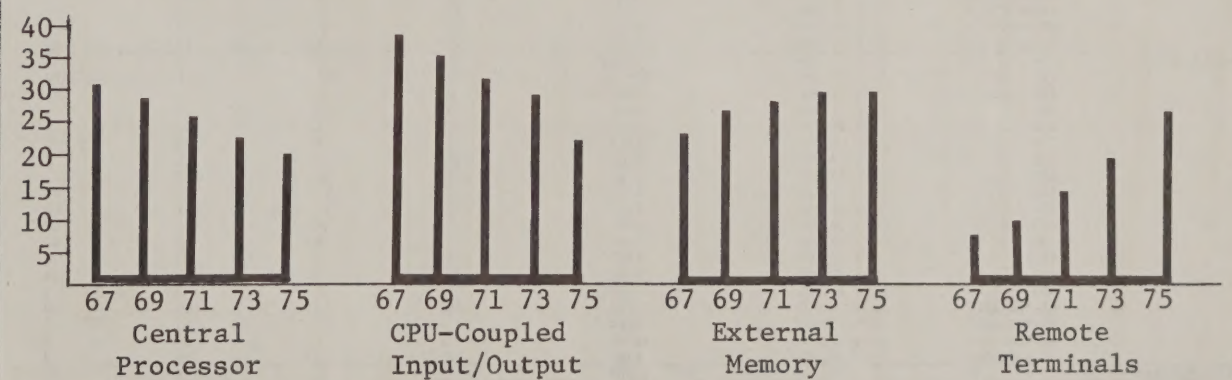
| Year | Value of Computer Equipment Shipped | | | Cumulative Net Value Installed (Yearend) | | |
|---|---|---|---|---|---|---|
| | U.S. | Outside U.S. | Worldwide | U.S. | Outside U.S. | Worldwide |
| 1969 | $ 5270-5370 | $ 2930-3030 | $ 8200-8400 | $21,100-21,850 | $ 9400-9650 | $30,500-31,500 |
| 1971 | 6390-6770 | 4110-4330 | 10,500-11,100 | 29,500-30,800 | 15,900-16,600 | 45,400-47,400 |
| 1973 | 9040-9600 | 5860-6300 | 14,900-15,900 | 39,800-41,300 | 25,200-26,700 | 65,000-68,000 |
| 1975 | 10,400-10,600 | 9000-9800 | 19,400-20,400 | 54,000-54,400 | 38,000-42,000 | 92,000-96,400 |

Chart I ESTIMATED DISTRIBUTION OF INSTALLED COMPUTERS BY CLASS
(Shown as percent of value installed worldwide, by year)




Class I -- Monthly rental of $500 - $5,000
Class II -- Monthly rental of $5,000 - $20,000
Class III -- Monthly rental of $20,000 and up

Chart II DISTRIBUTION OF COMPUTER SHIPMENT VALUE BY MAJOR SYSTEM COMPONENT
(Shown as percent of worldwide shipments, by year)



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF JANUARY 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 22 | 3 | 25 | X |
| | 220 | $ 14,000 | 10/58 | 26 | 2 | 28 | X |
| | B100 | $ 2,800 | 8/64 | 120 | 20 | 140 | X |
| | B200 Series | $ 5,500 | 11/61 | 448 | 82 | 530 | X |
| | B300 Series | $ 9,500 | 7/65 | 451 | 99 | 550 | 70 |
| | B500 | $ 3,800 | 11/68 | 10 | 0 | 10 | 80 |
| | B2500 | $ 5,000 | 2/67 | 82 | 18 | 100 | 110 |
| | B3500 | $ 14,000 | 5/67 | 96 | 24 | 120 | 210 |
| | B5500 | $ 26,000 | 3/63 | 86 | 8 | 94 | 5 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 65 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 16 |
| | B8500 | $200,000 | 1/69 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 269 | 11 | 280 | X |
| | G-20 | $ 15,500 | 4/61 | 17 | 2 | 19 | X |
| | LGP-21 | $ 725 | 12/62 | 143 | 3 | 146 | X |
| | LGP-30 | $ 1,300 | 9/56 | 100 | 5 | 105 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 47 | 4 | 51 | X |
| | 160*/160A/160C | $2,100/$5,000/$12,000 | 5/60;7/61;3/64 | 461 | 39 | 500 | X |
| | 924/924A | $ 11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 46 | 3 | 49 | X |
| | 1700 | $ 3,800 | 5/66 | 140 | 60 | 200 | 92 |
| | 3100/3150 | $ 10,500 | 12/64 | 105 | 23 | 128 | 18 |
| | 3200 | $ 14,000 | 5/64 | 45 | 15 | 60 | X |
| | 3300 | $ 20,500 | 9/65 | 113 | 30 | 143 | 20 |
| | 3400 | $ 19,000 | 11/64 | 15 | 4 | 19 | X |
| | 3500 | $ 25,000 | 1/69 | 0 | 0 | 0 | 24 |
| | 3600 | $ 52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $ 53,000 | 2/66 | 17 | 3 | 20 | X |
| | 6400/6500 | $ 58,000 | 5/66 | 51 | 18 | 69 | 26 |
| | 6600 | $115,000 | 8/64 | 45 | 13 | 58 | 16 |
| | 7600 | $235,000 | 1/69 | 0 | 0 | 0 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 50 | 2 | 52 | X |
| | PDP-4 | $ 1,700 | 8/62 | 40 | 5 | 45 | X |
| | PDP-5 | $ 900 | 9/63 | 90 | 10 | 100 | X |
| | PDP-6 | $ 10,000 | 10/64 | 18 | 3 | 21 | X |
| | PDP-7 | $ 1,300 | 11/64 | 124 | 36 | 160 | X |
| | PDP-8 | $ 525 | 4/65 | 1129 | 251 | 1380 | 25 |
| | PDP-9 | $ 1,100 | 12/66 | 233 | 80 | 313 | 30 |
| | PDP-10 | $ 11,000 | 10/67 | 36 | 8 | 44 | 22 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 70 | 30 | 100 | 20 |
| | 8400 | $ 10,000 | 6/65 | 19 | 6 | 25 | 1 |
| EMR Computer Division | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 16 | 0 | 16 | 2 |
| | ADVANCE 6040 | $ 5,600 | 7/65 | 8 | 3 | 11 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 27 | 6 | 33 | 18 |
| General Electric | 105 | $ 1,350 | 7/69 | 0 | 0 | 0 | 150 |
| | 115 | $ 2,200 | 12/65 | 440 | 635 | 1075 | 190 |
| | 130 | $ 4,500 | 3/69 | 0 | 0 | 0 | 145 |
| | 205 | $ 2,900 | 6/64 | 13 | 0 | 13 | X |
| | 210 | $ 16,000 | 7/59 | 33 | 0 | 33 | X |
| | 215 | $ 6,000 | 9/63 | 20 | 3 | 23 | X |
| | 225 | $ 8,800 | 4/61 | 144 | 20 | 164 | X |
| | 235 | $ 12,500 | 4/64 | 115 | 23 | 138 | 16 |
| | 405 | $ 6,200 | 2/68 | 52 | 13 | 65 | 40 |
| | 415 | $ 11,000 | 5/64 | 320 | 101 | 421 | 28 |
| | 425 | $ 19,500 | 6/64 | 118 | 34 | 152 | 30 |
| | 435 | $ 27,000 | 9/65 | 34 | 9 | 43 | 14 |
| | 625 | $ 54,000 | 4/65 | 32 | 5 | 37 | 8 |
| | 635 | $ 62,000 | 5/65 | 42 | 5 | 47 | 24 |
| | 645 | $ 90,000 | 7/66 | 7 | 0 | 7 | 2 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 80 | 30 | 110 | 60 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 45 | 20 | 65 | 5 |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 18 | 2 | 20 | 2 |
| Hewlett-Packard | 200A | $ 2,500 | 11/68 | 1 | 0 | 1 | 68 |



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AS OF JANUARY 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 74 | 2 | 76 | X |
| | DDP-116 | $ 950 | 4/65 | 203 | 43 | 246 | 13 |
| | DDP-124 | $ 2,150 | 3/66 | 56 | 17 | 73 | 16 |
| | DDP-224 | $ 3,600 | 3/65 | 48 | 10 | 58 | 2 |
| | DDP-516 | $ 780 | 9/66 | 220 | 60 | 280 | 180 |
| | H-110 | $ 2,500 | 9/68 | 25 | 5 | 30 | 95 |
| | H-120 | $ 4,200 | 1/66 | 780 | 195 | 975 | 85 |
| | H-125 | $ 5,000 | 12/67 | 84 | 16 | 100 | 115 |
| | H-200 | $ 9,200 | 3/64 | 830 | 350 | 1180 | 90 |
| | H-400 | $ 8,500 | 12/61 | 53 | 37 | 90 | X |
| | H-632 | $ 3,500 | 12/68 | 1 | 0 | 1 | 32 |
| | H-800 | $ 30,000 | 12/60 | 59 | 14 | 73 | X |
| | H-1200 | $ 11,600 | 2/66 | 235 | 60 | 295 | 75 |
| | H-1250 | $ 12,000 | 8/68 | 20 | 5 | 25 | 65 |
| | H-1400 | $ 14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,500 | 1/66 | 124 | 28 | 152 | 72 |
| | H-4200 | $ 20,500 | 9/68 | 4 | 0 | 4 | 22 |
| | H-8200 | $ 50,000 | 12/68 | 0 | 0 | 0 | 8 |
| IBM | 305 | $ 3,600 | 12/57 | 61 | 24 | 85 | X |
| | 360/20 | $ 2,800 | 12/65 | 5680 | 3920 | 9600 | 2100 |
| | 360/25 | $ 5,330 | 10/68 | 60 | 5 | 65 | 2700 |
| | 360/30 | $ 8,800 | 5/65 | 5415 | 3760 | 9175 | 850 |
| | 360/40 | $ 16,800 | 4/65 | 2550 | 1050 | 3600 | 600 |
| | 360/44 | $ 15,000 | 7/66 | 260 | 55 | 315 | 70 |
| | 360/50 | $ 32,000 | 8/65 | 1030 | 230 | 1260 | 700 |
| | 360/65 | $ 60,000 | 11/65 | 495 | 95 | 590 | 280 |
| | 360/67 | $138,000 | 6/66 | 41 | 9 | 50 | 33 |
| | 360/75 | $ 81,400 | 1/66 | 34 | 8 | 42 | 12 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 23 |
| | 360/90 Series | $150,000 | 11/67 | 8 | 0 | 8 | 11 |
| | 650 | $ 4,800 | 11/54 | 83 | 27 | 110 | X |
| | 1130 | $ 1,700 | 2/66 | 3200 | 1300 | 4500 | 2800 |
| | 1401 | $ 6,200 | 9/60 | 3000 | 1950 | 4950 | X |
| | 1401-G | $ 2,300 | 5/64 | 630 | 620 | 1250 | X |
| | 1401-H | $ 1,300 | 6/67 | 250 | 180 | 430 | X |
| | 1410 | $ 17,000 | 11/61 | 329 | 191 | 520 | X |
| | 1440 | $ 4,100 | 4/63 | 1680 | 1245 | 2925 | X |
| | 1460 | $ 9,800 | 10/63 | 622 | 118 | 740 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 875 | 475 | 1350 | X |
| | 1800 | $ 5,000 | 1/66 | 445 | 160 | 605 | 200 |
| | 7010 | $ 26,000 | 10/63 | 133 | 22 | 155 | X |
| | 702 | $ 6,900 | 2/55 | 3 | 0 | 3 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 18 | 2 | 20 | X |
| | 7040 | $ 25,000 | 6/63 | 56 | 44 | 100 | X |
| | 7044 | $ 36,500 | 6/63 | 89 | 32 | 121 | X |
| | 705 | $ 38,000 | 11/55 | 29 | 5 | 34 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 156 | 84 | 240 | X |
| | 7080 | $ 60,000 | 8/61 | 78 | 3 | 81 | X |
| | 709 | $ 40,000 | 8/58 | 3 | 0 | 3 | X |
| | 7090 | $ 63,500 | 11/59 | 30 | 6 | 36 | X |
| | 7094 | $ 75,500 | 9/62 | 93 | 3 | 96 | X |
| | 7094 II | $ 82,500 | 4/64 | 108 | 9 | 117 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 20 | 2 | 22 | X |
| | NCR-310 | $ 2,500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $ 9,000 | 5/62 | 535 | 277 | 812 | 25 |
| | NCR-315-RMC | $ 12,500 | 9/65 | 93 | 23 | 116 | 15 |
| | NCR-390 | $ 1,950 | 5/61 | 1025 | 475 | 1500 | X |
| | NCR-500 | $ 1,650 | 10/65 | 1700 | 780 | 2480 | 300 |
| | Century-100 | $ 2,645 | 9/68 | 65 | 0 | 65 | 840 |
| | Century-200 | $ 7,500 | 4/69 | 0 | 0 | 0 | 500 |
| Philco | 1000 | $ 7,010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $ 40,000 | 10/58 | 13 | 1 | 14 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,500 | 2/61 | 399 | 206 | 605 | X |
| | RCA 3301 | $ 19,000 | 7/64 | 75 | 10 | 85 | X |
| | RCA 501 | $ 14,000 | 6/59 | 76 | 2 | 78 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,500 | 9/65 | 149 | 66 | 215 | 60 |
| | Spectra 70/25 | $ 7,200 | 9/65 | 92 | 35 | 127 | 40 |
| | Spectra 70/35 | $ 8,400 | 1/67 | 146 | 62 | 208 | 135 |
| | Spectra 70/45 | $ 24,000 | 11/65 | 210 | 65 | 275 | 65 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 1 | 0 | 1 | 5 |
| | Spectra 70/55 | $ 35,000 | 11/66 | 14 | 2 | 16 | 15 |
| Raytheon | 250 | $ 1,200 | 12/60 | 122 | 48 | 170 | X |
| | 440 | $ 3,500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $ 3,200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp. | 650 | $ 500 | 5/66 | 23 | 0 | 23 | 0 |
| | 655 | $ 1,800 | 10/66 | 66 | 0 | 66 | 10 |
| | 660 | $ 2,000 | 10/65 | 11 | 0 | 11 | 2 |
| | 670 | $ 2,600 | 5/66 | 1 | 0 | 1 | 0 |
| | 4700 | $ 800 | 2/69 | 0 | 0 | 0 | 24 |
| | 6700 | $ 16,000 | 11/69 | 0 | 0 | 0 | 1 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 128 | 7 | 135 | X |
| | SDS-910 | $ 2,000 | 8/62 | 205 | 15 | 220 | X |
| | SDS-920 | $ 2,900 | 9/62 | 181 | 8 | 189 | X |
| | SDS-925 | $ 3,000 | 12/64 | 58 | 2 | 60 | X |
| | SDS-930 | $ 3,400 | 6/64 | 220 | 25 | 245 | X |
| | SDS-940 | $ 18,000 | 4/66 | 36 | 2 | 38 | 16 |
| | SDS-9300 | $ 8,500 | 11/64 | 32 | 2 | 34 | X |
| | Sigma 2 | $ 1,800 | 12/66 | 138 | 22 | 160 | 155 |
| | Sigma 5 | $ 7,000 | 8/67 | 53 | 17 | 70 | 65 |
| | Sigma 7 | $ 13,500 | 12/66 | 41 | 12 | 53 | 22 |
| Standard Computer Corp. | IC6000 | $ 18,000 | 5/67 | 13 | 0 | 13 | 12 |
| | IC4000 | $ 10,000 | 9/68 | 2 | 0 | 2 | 6 |
| Systems Eng Labs | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810 A/B | $900/$1,100 | 8/66;9/68 | 143 | 11 | 154 | 52 |
| | 840 | $ 1,400 | 11/65 | 4 | 0 | 4 | X |
| | 840 A/MP | $1,400/$1,600 | 8/66;10/67 | 56 | 2 | 58 | 26 |
| UNIVAC | I & II | $ 25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $ 21,000 | 8/62 | 74 | 13 | 87 | X |
| | File Computers | $ 15,000 | 8/56 | 9 | 0 | 9 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 103 | 72 | 175 | X |
| | 418 | $ 11,700 | 6/63 | 104 | 53 | 157 | 15 |
| | 490 Series | $ 32,000 | 12/61 | 182 | 26 | 208 | 30 |
| | 1004 | $ 1,900 | 2/63 | 1730 | 1010 | 2740 | X |
| | 1005 | $ 2,550 | 4/66 | 920 | 420 | 1340 | 60 |
| | 1050 | $ 8,800 | 9/63 | 185 | 85 | 270 | X |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1107 | $ 57,000 | 10/62 | 19 | 8 | 27 | X |
| | 1108 | $ 68,000 | 9/65 | 121 | 43 | 164 | 100 |
| | 9200 | $ 1,600 | 6/67 | 290 | 90 | 380 | 580 |
| | 9300 | $ 3,600 | 9/67 | 150 | 50 | 200 | 465 |
| | 9400 | $ 7,000 | 5/69 | 0 | 0 | 0 | 115 |
| | LARC | $135,000 | 5/60 | 2 | 0 | 2 | X |
| | | | TOTALS | 47,061 | 22,387 | 69,448 | 16,672 |



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February 10, - February 28, 1969

| | 1968-1969 High | 1968-1969 Low | 3 week Sales in 100's | 3 week High | 3 week Low | Last | 3 week Net Change | 3 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 2178 | 75 7/8 | 68 5/8 | 68 3/4 | - 1 1/4 | - 1.72 |
| American R & D | 207 | 122 1/2 | 342 | 176 | 156 | 158 | -14 1/4 | - 8.27 |
| Ampex Corp. | 42 3/8 | 26 1/2 | 1694 | 38 | 32 1/2 | 33 3/8 | - 3 1/2 | - 9.24 |
| Bunker Ramo | 21 3/8 | 13 1/2 | 5911 | 16 | 13 1/2 | 13 7/8 | - 2 | - 8.74 |
| Burroughs | 255 3/4 | 157 | 1267 | 245 5/8 | 220 5/8 | 223 1/4 | -15 1/2 | - 6.49 |
| Collins Radio | 101 1/8 | 52 | 1577 | 62 1/2 | 52 | 54 1/8 | - 7 | -11.45 |
| Computer Sciences | 67 3/8 | 31 5/8 | 1953 | 61 | 49 | 52 1/4 | - 8 3/4 | -14.34 |
| Control Data | 163 1/2 | 124 1/4 | 8418 | 144 1/4 | 125 1/8 | 127 1/4 | -13 1/4 | - 9.45 |
| Electronic Assoc. | 27 3/8 | 18 | 1019 | 24 | 19 3/8 | 19 5/8 | - 3 3/4 | -16.04 |
| General Electric | 100 3/8 | 80 1/4 | 3874 | 92 7/8 | 85 1/8 | 86 1/2 | - 5 3/8 | - 5.85 |
| Honeywell | 139 3/4 | 89 3/8 | 1320 | 122 3/4 | 113 5/8 | 115 3/4 | - 3 1/2 | - 2.94 |
| IBM | 375 | 293 1/4 | 3454 | 310 1/2 | 293 1/4 | 293 3/8 | - 4 5/8 | - 1.55 |
| ITT | 62 1/2 | 44 7/8 | 4597 | 55 | 51 | 51 1/2 | - 2 1/2 | - 4.63 |
| Litton | 104 3/4 | 55 | 5391 | 62 5/8 | 55 | 56 1/8 | - 3 7/8 | - 6.46 |
| Memorex | 93 1/2 | 61 1/2 | 2300 | 74 3/4 | 68 1/4 | 70 3/8 | + 2 7/8 | + 4.26 |
| Nat. Cash Register | 154 | 99 1/2 | 1274 | 121 3/4 | 108 1/8 | 108 7/8 | - 9 1/8 | - 7.73 |
| RCA | 55 | 42 | 5087 | 44 3/8 | 42 | 43 3/4 | - 5/8 | - 1.41 |
| Raytheon | 54 | 33 1/4 | 1497 | 45 | 39 1/2 | 39 7/8 | - 4 3/4 | -10.89 |
| Sanders | 66 1/2 | 40 3/4 | 2089 | 61 7/8 | 40 3/4 | 42 | -17 3/4 | -29.71 |
| Scientific Data | 119 3/4 | 79 3/4 | 6518 | 119 3/4 | 101 1/2 | 108 3/4 | + 8 1/4 | + 8.21 |
| SCM | 61 1/4 | 35 3/4 | 1763 | 44 7/8 | 39 7/8 | 40 | - 4 3/4 | -10.61 |
| Singer | 88 7/8 | 62 3/4 | 1548 | 84 1/4 | 82 1/2 | 75 5/8 | - 7 | - 8.47 |
| Sperry Rand | 63 3/8 | 41 3/8 | 4196 | 52 5/8 | 46 5/8 | 47 3/4 | - 4 1/4 | - 8.17 |
| Teledyne | 143 7/8 | 84 | 3161 | 100 3/4 | 84 | 84 1/8 | -18 3/8 | -17.93 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 5.70 | - 7.90 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 77 1/4 | 42 | 418 | 77 1/8 | 68 | 68 | - 4 1/4 | - 5.88 |
| Calcomp | 53 1/4 | 26 3/4 | 783 | 37 1/2 | 33 5/8 | 33 7/8 | - 1 1/4 | - 3.56 |
| Clary Corp. | 32 3/8 | 12 1/4 | 445 | 23 3/4 | 20 5/8 | 21 5/8 | - 1 7/8 | - 7.98 |
| Computer Applications | 42 5/8 | 16 1/4 | 428 | 19 7/8 | 16 1/2 | 16 1/2 | - 2 | -10.81 |
| Computing and Software | 93 1/4 | 43 1/2 | 221 | 89 | 74 1/2 | 74 1/2 | -15 1/2 | -17.22 |
| Data Proc. Fin. & Gen. | 72 1/2 | 46 | 3299 | 57 3/8 | 46 | 46 3/8 | - 5 1/8 | - 9.95 |
| Data Products | 28 7/8 | 17 1/8 | 2037 | 23 7/8 | 18 3/8 | 18 3/4 | - 4 1/2 | -19.15 |
| Digital Equipment | 179 | 95 1/4 | 327 | 165 | 138 1/2 | 143 1/2 | -20 | -12.32 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 1064 | 38 1/4 | 31 1/8 | 31 1/8 | - 2 1/4 | - 6.74 |
| Granite Computer | 58 7/8 | 32 1/4 | 593 | 40 1/4 | 32 1/4 | 32 5/8 | - 7 | -17.67 |
| Greyhound Computer | 43 1/2 | 22 | 466 | 26 7/8 | 22 | 22 | - 4 | -15.38 |
| Leasco | 143 | 70 3/4 | 4594 | 134 1/2 | 98 1/4 | 99 | -34 | -25.56 |
| Levin-Townsend Comp. | 67 3/4 | 42 | 1924 | 51 3/4 | 42 | 42 | - 9 3/8 | -18.24 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 676 | 33 1/8 | 25 5/8 | 26 1/4 | - 7 1/8 | - 2.13 |
| Mohawk Data Sciences | 107 1/2 | 58 | 2063 | 68 | 60 1/4 | 61 1/2 | - 4 1/2 | - 6.82 |
| Planning Research | 29 3/4 | 25 3/4 | 963 | 29 1/4 | 26 3/8 | 26 3/4 | - 1 5/8 | - 5.72 |
| Potter Instrument | 38 1/2 | 20 1/2 | 676 | 35 | 31 1/2 | 31 3/4 | - 2 1/2 | - 7.30 |
| Randolph Computers | 64 | 34 5/8 | 1566 | 43 3/4 | 35 1/8 | 35 1/4 | - 5 | -12.42 |
| Systems Eng. Labs. | 42 5/8 | 26 1/8 | 1254 | 31 | 26 1/8 | 27 1/8 | - 1 5/8 | - 5.65 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 6.91 | -11.08 |

| OVER-THE-COUNTER | 1968-1969 High Bid | 1968-1969 Low Bid | February 28, Bid | February 28, Asked | 3 weeks ago Bid | 3 week net change Bid | 3 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 36 1/2 | 14 1/2 | 35 | 37 | 35 | -- | -- |
| Aries Corp. | 24 | 12 1/2 | 13 | 14 1/2 | 16 | - 3 | -18.75 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 15 1/2 | 16 | 17 3/4 | - 2 1/4 | -12.68 |
| Computer Usage | 62 | 23 1/2 | 33 1/2 | 35 1/2 | 36 | - 2 1/2 | - 6.94 |
| Cyber-tronics | 19 | 9 1/2 | 9 1/2 | 10 | 11 | - 1 1/2 | -13.64 |
| Digitronics | 27 1/2 | 16 1/2 | 18 | 19 | 19 1/2 | - 1 1/2 | - 7.69 |
| DPA, Inc. | 20 3/8 | 11 | 11 | 11 3/8 | 13 1/4 | - 2 1/4 | -16.98 |
| Electronic Memories | 67 | 32 3/4 | 48 | 49 | 54 3/4 | - 6 3/4 | -12.33 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 10 3/4 | 11 1/4 | 11 5/8 | - 7/8 | - 7.52 |
| Informatics, Inc. | 34 | 16 | 21 | | 24 3/4 | - 3 3/4 | -15.15 |
| LMC Data, Inc. | 16 | 5 3/4 | 5 3/4 | 6 1/2 | 7 1/4 | - 1 1/2 | -20.69 |
| Management Assistance | 16 3/4 | 9 1/4 | 9 7/8 | 10 1/4 | 12 7/8 | - 3 | -23.30 |
| Optical Scanning Corp. | 145 | 71 | 91 | 93 | 108 | -17 | -15.74 |
| Recognition Equipment, Inc. | 101 | 38 1/2 | 56 | 58 | 69 | -13 | -18.84 |
| Tally Corp. | 51 1/2 | 27 | 27 | 29 | 33 | - 6 | -18.18 |
| TBS Computer Centers Corp. | 21 3/4 | 10 1/2 | 11 | 12 1/2 | 14 1/4 | - 3 1/4 | -22.81 |
| University Computing | 185 | 57 | 109 | 112 | 130 | -21 | -16.15 |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 4,1969 ● VOL.4,NO.15 P.J.McGOVERN,EDITOR

## IBM READIES PRICE "UNBUNDLING" AND NEW PRODUCT ANNOUNCEMENTS AS FIFTH ANNIVERSARY OF SYSTEM/360 INTRODUCTION APPROACHES

The fifth anniversary of IBM's announcement of its "billion dollar gamble" -- the introduction of System/360 -- is upon us. And today -- much as they were shortly before the announcement date of April 7, 1964 -- the computer industry's informal information pipelines are once again filled with speculation about the major announcements that are expected shortly from Armonk and White Plains.

In the first issue of this newsletter, dated March 23, 1964, EDP/IR reported many details of IBM's upcoming 360 announcement . . . some two weeks before the fact. It seems only appropriate, therefore, that we outline our thinking as to what can be expected from IBM, in the near future, and what the results may be. We hasten to point out that much of what is outlined in this report is based on rational analysis rather than inside information.

During the next two months, EDP/IR expects at least three significant announcements from IBM . . . though they may occur concurrently. One will cover policy; the others, products:

- The likely first announcement will concern and explain changes in IBM's pricing policies. We anticipate relatively minor changes at the time of announcement -- perhaps the complete separation of maintenance costs from rental contracts and a breakout of education costs from rental and purchase contracts -- with the groundwork being laid for more complete "unbundling" in the future.

- Due momentarily is the announcement of IBM's small new terminal computer . . . internally called the 3.7 because that's the size of its radical new credit-card-sized input card. This product would imply that IBM feels the time has come to sell computer power to even the smallest of businesses.

- Almost certain to be announced are the middle-of-the-line processors in the "5" series -- the 360/35 and 360/45. These communications-oriented machines will use programmable read-only memories for logic control and high-speed buffer memories to increase the efficiency with which main core is used. They will provide added flexibility to IBM in its upgrade activity . . . especially with those 40% to 50% of its System/360 customers who have advanced past the emulation stage and are working in the language designed for the computer.

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In the sections that follow, we take a brief look at this anticipated new hardware and examine its implications on the present and near-term computer marketplace. The bulk of this report, however, deals with various aspects of separate pricing, or unbundling. As we consider the possible pricing policy changes that IBM might make, we examine the effect of these on the other hardware, software, service, and leasing companies that constitute the computer industry.

IBM's likely new hardware

As pointed out above, two announcements about new hardware are expected. In all probability they will be made concurrently with or later than the disclosure of pricing policy changes because these changes could apply only to new equipment. It is fairly certain that IBM wants to give itself the freedom of taking this course of action, and therefore delayed any hardware announcements until pricing policies were set. Here is EDP/IR's thinking on the expected new hardware:

The small terminal computer. The 3.7, which in one form or another has been in the works for quite some time, looks like it could well be IBM's statement that the industry giant, too, sees the data processing system of the future as an array of tiny terminal computers -- capable of off-line processing -- linked to one or more superscale computers and master memory banks (EDP/IR Mar.25,1969). The new computer will probably be the beginning of a family of small computers -- much like Burroughs apparently plans with the TC-500 -- that eventually will replace bookkeeping machines and unit record equipment through an evolutionary process.

IBM certainly has implied this with its announcement of its Basic Systems Centers (EDP/IR Mar.12,1969). These were set up to provide one-stop service to all users of 360/20s, 1130s, the 6400 accounting machines, and unit record equipment. With deliveries in the tens of thousands being talked about, it looks as if IBM will be taking this approach to capitalize on its unit record equipment base and that, in the foreseeable future, the common Hollerith card -- called "IBM card" by most -- may begin to fade from the picture.

The line-expanding computers. Internally called NS/1 and NS/2 (for New System), the computers expected to be announced as the 360/35 and 360/45 seem certain to be IBM's entry into the transition generation. They will probably have more third-generation (integrated circuit) hardware and the new high-speed buffer memory -- found in the 360/85 -- that gives significantly improved central processor performance.

These computers are almost a must for IBM. The 360/30, 360/40, and 360/50 are in "limited new production." (In other words, some shipments of these computers are not from the production line but are those turned in by customers who have upgraded their systems.) A few IBM customers will probably satisfy their growing computational needs by simply adding a processor like the one they currently use. Indeed, this is one of the major markets looked to by third-party leasing companies. Other customers, however, have expanding needs that require new computers.

These two new processors will probably fit into IBM's product line not so much the way that Univac's new 1106 (announced last week) adds a potential new customer base to a successful product, but more in the manner that the new member of Honeywell's Series 200 -- probably to be called the H-3200 -- will give communications and transition generation capabilities to one of the older members of a computer series. (In Honeywell's case, it is the H-2200, which along with the H-200 was announced before the full Series 200 was disclosed.) For IBM, the new models should extend System/360 into the early 1970s, providing the machine necessary to upgrade the present user who programs in System/360 language, needs more throughput, and has growing communications requirements.



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## Separate pricing and pending litigation

Five days before Control Data filed the first of three antitrust suits pending against IBM (EDP/IR Dec.23,1968), IBM announced that it was studying the manner in which it charges for its hardware and software and said it would announce new policies by the middle of the year. After suits were also filed by DPF&G (EDP/IR Jan.9,1969) and the Justice Department (EDP/IR Jan.28,1969), almost everyone assumed that some form of separate pricing would be forthcoming on the part of IBM.

EDP/IR also thinks this is the case. And to set the framework within which to evaluate what may lie ahead, we asked attorney Robert P. Bigelow -- who has carefully followed the computer industry and its relationship with such areas of the law as antitrust and patents -- to discuss the pending litigation and speculate on its possible outcome. Here are some of his thoughts:

> "What is likely to happen? There are at least four possibilities: 1) no change in the status quo; 2) separate pricing for hardware and software and support; 3) the independent subsidiary or SBC [Service Bureau Corp., set up under the 1956 consent decree]; and 4) the divorcement, by forcing a sale of a part of the business."
>
> "Because of the potentially disastrous effect of a finally adverse decree, in the Government suit and the multitude of private actions which could arrive therefrom, the odds seem to be against the Attorney General's case ever going to trial. Some eighty percent of Government cases end up as consent decrees, undoubtedly in large part because they cannot be then used as evidence against the defendant."
>
> "My own very cloudy crystal ball forecasts the establishment of another independent subsidiary or two; no domestic divestiture; and injunctive relief against some of the marketing practices which the Attorney General claims are illegal. My guess, in the private suits -- both those filed already and others which might be filed -- is for settlement, not trial, with agreements under which IBM will pick up most of the litigation costs (maybe an agreement . . . a settlement . . . which will cover the plaintiffs' legal fees, so to speak). IBM will also stop some of the practices which others claim are unfair."

## What do prices look like now?

Before we explore Separate Pricing in some of its many possible variations, EDP/IR feels that it must answer two questions:

1) How is the customer's dollar for data processing equipment distributed among IBM's internal cost categories?

2) How can these costs be prorated into an allocation of costs to the customer for service, advertising, profit, administration, marketing, manufacturing, and the like?

The figures which we present, overleaf, are strictly internally developed. We have tried to check them out as widely as possible -- and find agreement from several sources. It must be completely understood, however, that this in no way represents positive knowledge of how IBM in fact distributes costs or allocates prices.



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I. ESTIMATED INTERNAL DISTRIBUTION OF IBM RENTAL DOLLAR (in cents)

a. Manufacturing (as low as 8¢ to 9¢ for central processor to as high as 25¢ to 30¢ on electro/mechanical equipment, such as peripherals, where high assembly cost is involved) . . . . . 20.0¢

b. Marketing (including systems analysis before a sale). . . . . 15.0¢

c. Customer Support-Custom System Analysis (such as performed by IBM's systems engineers) . . . . . 4.5¢

d. Customer Support-Software (includes market-oriented software such as applications packages and the field maintenance of standard utility routines and compilers) . . . . . 3.5¢

e. Customer Support-Education (not including internal training of IBM employees) . . . . . 1.0¢

f. Administration (includes overhead and internal training). . . . . 11.0¢

g. Engineering Development (the reduction of technology from research laboratory into the hardware product). . . . . 3.0¢

h. Software Development (system software only, such as operating systems, compilers, and other software common to a product line). 3.0¢

i. General R&D (basic technology research and investigation into new component technology) . . . . . 4.0¢

j. Maintenance . . . . . 10.0¢

k. Profit . . . . . 25.0¢

II. ESTIMATED ALLOCATION OF COSTS TO CUSTOMERS

| | Direct | R&D | Marketing | Admin | Total | % of Total |
|---|---|---|---|---|---|---|
| Equipment (Manufacturing and Engineering + 1/2 Software Development) | 24.5 | 3 | 10.5 | 6 | 44 | 58.5 |
| Software (Customer Support-Software + 1/2 Software Development) | 5 | | 2 | 1.25 | 8.25 | 11 |
| Customer Support-Custom System Analysis | 4.5 | 1 | 2 | 1 | 8.5 | 11.5 |
| Customer Support-Education | 1 | | .5 | .25 | 1.75 | 2.5 |
| Maintenance | 10 | | | 2.5 | 12.5 | 16.5 |

THESE FIGURES ARE ESTIMATES PREPARED BY THE INTERNATIONAL DATA CORPORATION



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The important thing about these EDP/IR estimates is that they provide a framework around which to present our analysis. Any reader who wishes to use different numbers can still follow the logic. It is important to notice that, in part II, we have identified indirect costs that at times are not considered. Consider the figures that relate to software, for example.

Many publications have quoted "three percent" as being the software development cost to the manufacturer. We agree. That, indeed, is the software development cost of the basic systems software. But when this (see part II) plus custom customer services is looked at as an allocation to customers, we find the total value of software, as the IBM customer sees it, accounts for about 22.5% of costs.

Also, in part II, profit is distributed on a straight pro-rata basis to each activity, based on internal costs. EDP/IR's own expectation, however, is that if IBM is not prevented from doing so by the Justice Department, it will not establish similar profit objectives for each separately priced item. Hardware will carry a significantly higher profit objective, and custom customer services and software, lower ones. Hardware, therefore, might be 75% to 80% of the total bill to the average customer rather than the 58% to 59% on the straight pro-rata basis.

## How will prices look after unbundling?

To unbundle, IBM could announce separate pricing strictly for future computers (hence, the delay in new product announcements), and continue a common, bundled support package for the current product line. Most complaints, however, relate to the available market and current base of installed equipment, so we think that an "upstream" unbundling technique would be unsatisfactory. Unbundling, whatever its form, will probably apply to installed as well as future equipment.

When unbundling is announced, the rental customer likely will be given at least a one-year continuation of his current level of support and service . . . at the same rental. After that, he would probably be offered a comprehensive package that would provide the same support level . . . at a cost increase of perhaps five to ten percent. The justification of this will be based on IBM's higher than anticipated maintenance costs for the 360 (last fall IBM attempted to raise maintenance prices for this line), and the extra administrative cost of separate prices.

For users who own IBM equipment, we see an allocation of services -- past and future -- over an equivalent useful computer lifetime, probably five years. This credit would be assigned on a declining basis, with perhaps half or more being used up during the first 18 to 24 months of installation. This credit -- for support, custom services, and education -- could be provided as scrip, redeemable in any mix of these services. Thus a customer with several purchased computers would get a certain number of books of "Gray Stamps" -- based on how long individual computers had been installed -- that he could apply to his total needs from IBM.

## Effects of unbundling on various industry segments

Depending on the outcome of the various antitrust suits, there are three conditions under which separate pricing could be implemented in the marketplace: 1) continuation of IBM, basically as is, with restrictions on such things as the educational discount and various other marketing policies; 2) the SBC approach, where each service sector within IBM would be managed independently, with common ownership and central financial management; 3) the complete divestiture approach, where each of these companies would be independently owned operations.



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In the following discussion of the effects of separate pricing, we take a look at various situations as they might affect IBM, other mainframe manufacturers, peripheral manufacturers, software companies, and leasing firms. The numbers 1), 2), and 3) refer to the alternatives on the previous page.

IBM - 1): On the surface, separate pricing seems to be exactly what IBM wants; there is a strong indication, in fact, that IBM is delighted to have outside pressure for the degree of pricing flexibility that separate pricing could allow. With separate pricing, IBM's ability to upgrade customers is no longer strictly dependent on the delivery of new products; rather, the company would be in a position to sell additional software packages, customer support, and custom customer services. Thus, IBM would have much more flexible control over revenue income flow.

Other mainframe manufacturers - 1): For IBM's competitors, separate pricing would mean that the price/performance umbrella will be severely dropped when hardware prices come down conceivably to 60% and practically to the 70% to 80% level. Companies oriented toward a heavy degree of customer support -- companies such as Honeywell, Burroughs, and NCR -- might follow the IBM lead and separate their prices also. Companies with a lessened degree of customer software support, such as RCA and GE, would be in a somewhat less favorable position to do so. And Univac, Control Data, and SDS, companies that are more oriented toward selling the raw performance power of their hardware, would find IBM a much more severe competitor on a price basis.

General comments on mainframe manufacturers - 1): Interviews with and an analysis of IBM's current customers lead EDP/IR to estimate that upward of 80% of these customers would probably subscribe to a comprehensive package and continue to obtain all their services from IBM. As a result, about 20% of IBM's customer base -- just less than the number of customers controlled by all competing manufacturers -- will be selecting support services on a comparison basis. The impact of separate pricing on the dollars available to other suppliers, then, is not so great as might have been expected.

IBM - 2): With separately managed companies operating autonomously under a corporate structure, IBM would lose some of its effectiveness in coordinating the design of hardware, customer services, software, and the like. This would probably result in a decline of hardware shipments as a percent of the market. On the other hand, a profit-making software company would help customers make more effective use of their hardware . . . shifting more of the customer's dollar into the service field. Under this condition, therefore, the net revenues to IBM would be about the same as under condition 1).

IBM - 3): Considering the computer's impact on the economy, EDP/IR considers the complete separation of IBM into distinct elements as a highly improbable development. Such an action would have a drastic effect on IBM. For one thing, the management of a software company of 35,000 or 45,000 people would prove extremely difficult . . . fragmentation by way of innumerable spinoffs would most likely develop . . . and as a result it would be very difficult for IBM users to obtain the level of customer and software support that would be required if new applications are to be implemented at the rate they are today. If this situation occurs, we would expect IBM's share of hardware shipments to drop to about 50% of the market within about five years after its establishment. As a result, competitors that could keep their complete service operations would gain considerable ground. The general industry, however, probably would suffer.



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Peripherals - 1): The big selling point of most peripheral manufacturers is the plug-for-plug compatibility with IBM equipment. They provide negligible software support for this. With separate pricing, these manufacturers not only would be competing with equipment priced at 60% to 80% its former price; they also, for the first time, would have to provide software support, perhaps at increased cost to the customer because of the additional expense in preparing software. Thus, the cost for CPU-coupled equipment and external memory, from independent peripheral manufacturers, would rise sharply. The end-user market for these companies would be a great deal less attractive. The impact on manufacturers of remote terminals would be considerably less, since the common carriers' standard communications interface permits terminals to be more freely interchanged.

Peripherals - 2): Under this condition, there would be a slowdown in the introduction of IBM equipment using new technologies, and therefore more markets could conceivably be opened. Thus, in this situation, we think that the peripheral equipment manufacturers would maintain about the same market level projected now.

Peripherals - 3): With IBM being just a large, independent hardware company under this condition, the peripheral equipment manufacturers would have access to quite a wide market, and would be able to draw upon the same range of independent service companies as a user of IBM equipment. Thus, the percentage of the total market, in this situation, could be one to two times that projected if the capital and manufacturing capabilities of the independents could support the volume.

Software: Although quite a few dollars will theoretically be available for purchasing software under condition 1), we estimate that the bulk of this -- 85% to 90% -- will still go to mainframe manufacturers, resulting in an expansion by 30% to 40% of the independent software market. Under condition 2), IBM subsidiaries will operate more independently, competition will be more intense, and independents will have less chance to make inroads into the market. If IBM can hold its organization together, it could become a very intense competitor, but our thinking is that the independents would be able to get only 10% to 12% of the total software business . . . an expansion of 30% to 35%. Finally, under condition 3) the IBM software company faces severe management problems, and the odds of fractionation are quite good. Thus, the market for the independents would be about double.

Leasing: Representing, as they do, a large body of people who own computers, the third-party leasing companies have an enormous interest in any pricing policy changes that IBM may announce. Likewise, IBM will probably structure any changes to make it possible to live with these companies.

IBM's price policy changes will probably include separating out software support and education costs. Under its current subsequent user policy, IBM agrees to supply these services to users of purchased equipment "at no additional charge as long as they are offered to first users on this basis." Thus, separately charging these services to all customers would give IBM relief in two of the areas where its profits are squeezed. Going further -- introducing a retroactive change and introducing "scrip" -- would probably bring loud complaints from leasing companies that may contend they don't want IBM service . . . that they want to do it themselves. On this point, it seems to EDP/IR that most of this scrip would be used up anyway by the time a leasing company could develop a full independent service capability.

SUMMARY: At this time, only one thing is relatively certain: For the probable changes from the status quo, the average computer customer will pay slightly more than he does at present . . . and IBM is not likely to feel an adverse effect.



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March 3, - March 21, 1969

| | 1968-1969 High | 1968-1969 Low | 3 week Sales in 100's | 3 week High | 3 week Low | Last | 3 week Net Change | 3 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 91 7/8 | 52 | 2010 | 70 1/2 | 65 1/4 | 69 3/8 | + 5/8 | + 0.90 |
| American R & D | 207 | 122 1/2 | 503 | 177 | 154 1/2 | 175 1/4 | +17 1/4 | +10.92 |
| Ampex Corp. | 42 3/8 | 26 1/2 | 2217 | 37 3/4 | 32 5/8 | 37 1/2 | + 4 1/8 | +12.35 |
| Bunker Ramo | 21 3/8 | 13 1/8 | 3300 | 14 1/4 | 13 1/8 | 13 5/8 | - 1/4 | - 1.80 |
| Burroughs | 255 3/4 | 157 | 1984 | 250 1/2 | 222 | 243 7/8 | +20 5/8 | + 9.24 |
| Collins Radio | 101 1/8 | 48 | 1380 | 54 3/4 | 48 | 50 3/8 | - 3 3/4 | - 6.93 |
| Computer Sciences | 67 3/8 | 31 5/8 | 1051 | 59 1/2 | 50 | 58 3/4 | + 6 1/2 | +12.32 |
| Control Data | 163 1/2 | 124 1/2 | 6590 | 139 1/4 | 127 3/4 | 135 5/8 | + 8 3/8 | + 6.58 |
| Electronic Assoc. | 27 3/8 | 18 | 584 | 21 1/4 | 19 3/8 | 20 | + 3/8 | + 1.89 |
| General Electric | 100 3/8 | 80 1/4 | 4107 | 90 1/2 | 85 3/4 | 89 3/8 | + 2 7/8 | + 3.32 |
| Honeywell | 139 3/4 | 89 3/8 | 1675 | 128 1/2 | 115 3/4 | 126 1/4 | +10 1/2 | + 9.07 |
| IBM | 375 | 291 3/4 | 2973 | 307 3/4 | 291 3/4 | 305 1/2 | +12 1/8 | + 4.13 |
| ITT | 62 1/2 | 44 7/8 | 5162 | 53 3/4 | 48 1/2 | 52 5/8 | + 1 1/8 | + 2.17 |
| Litton | 104 3/4 | 48 1/4 | 5612 | 53 3/4 | 48 1/4 | 53 3/8 | - 2 3/4 | - 4.90 |
| Memorex | 93 1/2 | 61 1/2 | 1900 | 78 5/8 | 70 1/4 | 76 1/4 | + 5 7/8 | + 8.34 |
| National Cash Register | 154 1/4 | 99 1/2 | 1834 | 123 5/8 | 108 | 122 1/8 | +13 1/4 | +12.17 |
| RCA | 55 | 41 | 5702 | 44 1/4 | 41 3/8 | 42 1/2 | - 1 1/4 | - 2.86 |
| Raytheon | 54 | 33 1/4 | 1884 | 42 1/4 | 38 | 39 1/4 | - 5/8 | - 1.56 |
| Sanders | 66 1/2 | 40 | 2035 | 44 7/8 | 40 | 41 | - 1 | - 2.38 |
| Scientific Data | 119 3/4 | 79 3/4 | 3169 | 116 | 106 1/2 | 113 3/4 | + 5 | + 4.60 |
| SCM | 61 1/4 | 35 3/4 | 1341 | 41 3/8 | 38 | 39 3/4 | - 1/4 | - 0.63 |
| Singer | 88 7/8 | 62 3/4 | 1130 | 78 3/4 | 71 3/4 | 75 1/4 | - 3/8 | - 0.49 |
| Sperry Rand | 63 3/8 | 41 3/8 | 6232 | 51 3/8 | 45 7/8 | 50 1/2 | + 2 3/4 | + 5.76 |
| *Teledyne | 45 1/2 | 40 1/8 | 829 | 45 1/4 | 40 1/8 | 43 1/8 | + 1 | + 2.37 |
| **Xerox | 328 1/2 | 229 | 1816 | 260 3/4 | 252 1/2 | 256 | - 1/2 | - 0.19 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 4.08 | + 3.38 |

* Adjusted for stock split
** Added this issue

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic DP | 77 1/4 | 42 | 784 | 70 5/8 | 64 3/8 | 68 | -- | -- |
| Calcomp | 53 1/4 | 26 3/4 | 560 | 34 1/2 | 31 1/8 | 33 | - 7/8 | - 2.65 |
| Clary Corp | 32 3/8 | 12 1/4 | 432 | 22 3/8 | 19 5/8 | 20 7/8 | - 3/4 | - 3.59 |
| Computer Applications | 42 5/8 | 16 3/8 | 320 | 19 | 16 3/8 | 17 7/8 | + 1 3/8 | + 7.69 |
| Computing and Software | 93 1/4 | 43 1/2 | 227 | 82 1/4 | 73 | 81 3/4 | + 7 1/4 | + 8.81 |
| Data Proc. Fin. & Gen. | 72 1/4 | 44 1/2 | 1753 | 49 3/4 | 44 1/2 | 47 1/8 | + 3/4 | + 1.59 |
| Data Products | 28 7/8 | 17 1/8 | 1845 | 20 | 17 3/4 | 19 1/4 | + 1/2 | + 2.60 |
| Digital Equipment | 179 | 95 1/4 | 542 | 160 | 143 1/2 | 157 5/8 | +14 1/8 | + 8.96 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 362 | 34 3/8 | 29 1/2 | 32 3/8 | + 1 1/4 | + 3.86 |
| Granite Computer | 58 7/8 | 32 1/4 | 511 | 37 3/4 | 32 3/4 | 35 5/8 | + 3 | + 8.42 |
| Greyhound Computer | 43 1/4 | 21 | 421 | 23 3/8 | 21 | 22 1/4 | + 1/4 | + 1.12 |
| *Leasco | 54 | 36 | 8631 | 43 7/8 | 36 | 43 | - 1 3/4 | - 4.06 |
| Levin-Townsend Comp. | 67 3/4 | 39 5/8 | 2359 | 45 3/8 | 39 5/8 | 40 5/8 | - 1 3/8 | - 3.27 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 989 | 26 3/8 | 20 1/4 | 24 | - 1 3/4 | - 6.67 |
| Mohawk Data Sciences | 107 1/2 | 58 | 3286 | 75 5/8 | 61 1/2 | 73 | +12 3/4 | +20.73 |
| Planning Research | 29 3/4 | 23 7/8 | 1155 | 28 | 23 7/8 | 27 7/8 | - 1 1/8 | - 4.21 |
| Potter Instrument | 38 1/2 | 20 1/2 | 778 | 32 7/8 | 29 1/8 | 30 5/8 | - 1 1/8 | - 3.54 |
| Randolph Computers | 64 | 32 3/8 | 801 | 36 1/2 | 32 3/8 | 32 3/4 | - 2 1/2 | - 7.09 |
| Sys. Eng. Labs. | 42 5/8 | 26 1/8 | 1045 | 31 1/4 | 27 | 31 1/8 | + 4 | +14.75 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 1.79 | + 2.29 |

* Stock split

| | 1968-1969 High Bid | 1968-1969 Low Bid | March 21 Bid | March 21 Asked | 3 weeks ago Bid | 3 week net change Bid | 3 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 1/2 | 14 1/2 | 31 | 33 | 35 | - 4 | -11.42 |
| Aries Corp. | 24 | 8 1/2 | 8 1/2 | 9 1/2 | 16 | - 7 1/2 | -46.84 |
| Bolt, Beranek & Newman, Inc. | 27 1/2 | 14 | 14 1/2 | 15 1/2 | 17 3/4 | - 3 1/4 | -18.31 |
| Computer Usage | 62 | 23 1/2 | 33 | 34 1/2 | 36 | - 3 | - 8.33 |
| Cyber-tronics | 19 | 9 1/8 | 9 3/4 | 10 1/4 | 11 | - 1 1/4 | -11.36 |
| Digitronics | 27 1/2 | 16 1/2 | 17 1/2 | 18 1/2 | 19 1/2 | - 2 | -10.26 |
| DPA, Inc. | 20 3/8 | 10 7/8 | 10 7/8 | 11 1/4 | 13 1/4 | - 2 3/8 | -17.92 |
| Electronic Memories | 67 | 32 3/4 | 47 3/4 | 48 3/4 | 54 3/4 | - 7 | -12.79 |
| Fabri-Tek | 20 3/4 | 8 7/8 | 12 | 12 1/2 | 11 5/8 | + 3/8 | + 3.26 |
| Informatics, Inc. | 34 | 16 | 21 | ** | 24 3/4 | - 3 3/4 | -15.15 |
| LMC Data, Inc. | 16 | 5 3/4 | 6 | 6 3/4 | 7 1/4 | - 1 1/4 | -17.24 |
| Management Assistance | 16 3/4 | 8 5/8 | 10 1/2 | 11 | 12 7/8 | - 2 3/8 | -18.44 |
| Optical Scanning Corp. | 145 | 71 | 71 | 75 | 108 | -37 | -34.26 |
| Recognition Equipment, Inc. | 101 | 38 1/2 | 64 | 65 | 69 | - 5 | - 7.25 |
| Tally Corp. | 51 1/2 | 22 | 22 | 29 | 33 | -11 | -33.33 |
| TBS Computer Centers Corp. | 21 3/4 | 10 1/2 | 14 | 15 1/2 | 14 1/4 | - 1/4 | - 1.75 |
| University Computing | 185 | 57 | 105 | 108 | 130 | -25 | -19.23 |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 24,1969 ● VOL.4,NO.16 P.J.McGOVERN,EDITOR

One, two, three . . . Again!

## SOFTWARE'S "PSEUDO-PRICE" DESCRIBED AS "ZERO-DOLLARS"

When Data Processing Financial & General, the leasing company, filed suit against IBM in the wake of antitrust action from Control Data, it looked as if IBM was going to be considered fair game for everyone within reach of a lawyer. Then, just before members of the Nixon administration began to find their offices, the Justice Department presented its formal charges at the clerk's office in the Federal Court for the Southern District of New York . . . and the computer industry, in a sense, was relieved. Most observers settled back for several long years of watching what would happen to the industry.

But not everyone, it seems, was satisfied.

Another sector of the computer industry has now been heard from. Tiny ($4.2 million in sales last year) Applied Data Research, Inc. -- the software house that pioneered the sale of separately priced software packages and last year was awarded the "first software patent" -- this week sent its lawyers into the same New York City court where DPF&G and Justice had filed. They deposited another 45 pages of legal complaint against IBM.

There are a few different twists in the ADR suit, however. The charges include contempt of court as well as antitrust violations. And many of the twists turn around semantics . . . some of a legalistic nature, some that seem more like "catch phrases" designed to attract attention:

- Software is defined in the complaint as a "device used as a control attachment and machine extension for the hardware." As such, goes the allegation, the supplying of software as part of the system "bundle" is a tie-in sale that violates the 1956 consent decree.

- In supplying software as part of this bundle, says the complaint, IBM has "destroyed the market for software packages by supplying the packages at a pseudo-price of zero-dollars; the overt, separate and real price set by software companies, including ADR, thereby tends to be viewed by potential customers as impossibly expensive."

- In addition, says ADR, "IBM has wrongfully and deceptively developed . . . a viewpoint among computer users . . . that computer software is an intangible without market or property value, and IBM has done so notwithstanding that a large financial investment is required . . ."

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What Applied Data is asking

Since ADR's suit also involves antitrust, the prayer for relief, as would be expected, asks the court to find IBM in violation of the Sherman and Clayton Antitrust Acts and therefore to issue permanent injunctions that will prevent the continuation of such violations. In addition, the prayer asks that the court order IBM "to divest itself from all activities in the manufacture and marketing of software packages, in the marketing of custom software and services, and in the marketing of data processing services."

More significantly, however, this complaint goes into much more detail in alleging actual damages to ADR. The major things requested in the prayer are of a financial or business nature:

- Because of IBM's "wilful contempt" in connection with tie-in sales, ADP asks the court to force IBM to make a rebate to all its customers "such sum as fairly reflects the portion of the sales or lease price charged such purchasers and lessees as is properly attributable to the software, taking into account the commercially reasonable price . . ."

- To provide for this, ADR further asks that IBM be made to "set aside as a Special Rebate Fund the sum of $3,574,447,728, or such larger sum as the Court may direct, which represents the aggregate portion of contemnor IBM's net earnings before income tax for the years 1959 through 1968 properly attributable to its unlawful conduct" because of tie-in sales.

  This extremely "precise" number is based on the allegation that "the software share of IBM revenue approximates between 35% and 50% of its total revenue derived from its pricing of sales, service and rentals of IBM hardware" and that the software market "thus foreclosed" during the ten-year period 1959-1968 "is approximately between $9,626,475,366 and $13,752,107,666."

- On its own behalf, ADR asks for a judgment in the amount of $903,837,000, "constituting treble the damages of $301,279,000 sustained by ADR to the date of the filing of this Complaint." This is the "direct loss of profits" or "loss of profits" because "both the financial and technological development of ADR" were "seriously retarded and impaired," ADR says in the complaint.

- More specifically, ADR alleges that "IBM, by its false and deliberate misrepresentations that the IBM/360 FLOWCHART software package contains the features of automatic page planning, has interfered with ADR's business in its AUTOFLOW package, and by reason of its widespread distribution of its manual FLOWCHART package of inferior quality that IBM deceptively describes as automatic, IBM has seriously injured the entire market for ADR's truly automatic AUTOFLOW package." This, says ADR, resulted in $90 million worth of damages.

- ADR further asks the court to order "(a) that IBM's transfer to Service Bureau Corporation of its time-sharing service business was wrongful, unlawful, null and void and of no legal effect, (b) that IBM offer for public sale . . . the said time-sharing service business, and (c) that IBM furnish immediately to ADR the same information with respect to



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the said time-sharing service, including the names and addresses of all customers thereof, as was wrongfully and discriminatorily furnished to Service Bureau Corporation."

- Also, according to ADR, "IBM has committed a fraud on the U.S. Patent Office by applying for and obtaining patents for computer systems based on software but disguised as hardware. Concurrently therewith, IBM interfered with and sought to prevent software companies including ADR from obtaining legal protection for their innovations and software packages . . ." In these actions, the complaint continues, IBM "was and is attempting to develop a state of confusion as to the technological character of software . . ." One of the final prayers, therefore, is for the court to "order, adjudge and decree that IBM's patents, issued and pending and in process of preparation, and relating in any manner to electronic data processing systems, are unenforceable."

Analysis and prognosis

Once again, as we have said in covering the previous antitrust cases (EDP/IR Dec.23,1969;Jan. 9 and Jan.28,1969), EDP/IR repeats: We do not intend to be judge or jury. We also repeat our hope that the computer industry is not being disrupted merely for the sake of striking out against the company that led it to its present healthy level.

The crux of the case -- certainly one important aspect of it -- seems to revolve around the definition of software and whether or not IBM has violated the consent decree. The tie-in provision under consideration reads as follows:

> *IBM is hereby enjoined and restrained from conditioning the sale or lease of any standard tabulating or electronic data processing machine (which shall include any machine unit on a separate base even if in normal use it is mechanically or electrically connected with another such machine unit) upon the purchase or lease of any other standard tabulating or electronic data processing machine.*

ADR, in its complaint, is attempting to have software, or programs, defined as "devices" and therefore a separate machine that converts a general-purpose computer into a special-purpose computer. "The stored-program computer provides a tool of immense versatility since the electrical signals required to control the sequencing of the computer, instead of being derived from prefabricated circuits, are recorded in a device such as a magnetic tape or disc, and attached to and inserted in the memory of the hardware for its automatic control. When the program device is operatively attached to the hardware, the computer system or extended machine that is thereby constructed is one created by the computer software. . . That is, each time a new computer system is desired, it is merely necessary to replace one software device and attachment by another." [Emphasis added.] This case, then, may well rest on the acceptance of a definition.

And surely good definitions are needed.

The bigger question here, it seems, is whether this is just another in a long series of slightly different suits. Indeed, IBM says of this suit, in a one-sentence statement, that it "intends to defend itself vigorously." If more and more suits are filed, EDP/IR can't help but wonder if so much won't be spent in legal efforts -- or set aside in reserves -- that the profit of the overall computer industry will suffer.



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## COMPUTER STOCK PRICES, ON AVERAGE, WERE FLAT DURING 1968 WHILE NEW ISSUES CONTINUED TO SPARK INVESTOR INTEREST

Unlike 1967, in which almost every computer stock showed a significant increase in stock market price (see table on opposite page), 1968 was a year in which the average price movement for the more "mature" computer stocks was virtually zero. There were selective increases -- the highest just under 100% -- for the issues normally carried in the EDP/IR stock table, but there were also losses of as much as 40%.

The real action during 1968 came from new issues of companies in the computer industry. The record for many of the companies which went public during the second half of 1968 is shown below. Even among these so-called "high fliers," however, 14 out of 70 started 1969 with bid prices lower than the offering.

Continuing a trend which became very apparent during 1968, shares of most new issues were almost unavailable to the average investor . . . at the offering price. Normally, only friends of the company -- or very good customers of the underwriter -- were able to obtain shares. One reason for the scarcity of these shares was the relatively small number made available and the large demand. Equally important was the fact that quite a few of the mutual funds began to seek blocks of new issues. Some were purchased for investment, of course, but many were acquired for quick turnover and the almost built-in profit which the hot new issue market seemed to insure. There are reports of large blocks of new issues trading one or two days after the offering, and many attribute this to "go-go" funds.

### MARKET REACTION DURING SECOND HALF OF 1968 TO NEW ISSUES FROM COMPANIES IN THE DATA PROCESSING FIELD

| Name of Company | Date of Issue | Offering Price | Bid 1/21/69 | % Change |
|---|---|---|---|---|
| Advance Computer Utilities Corp. | 7/17/68 | 5 | 29 | +480.00 |
| U.S. Time-Sharing, Inc. | 7/18/68 | 3 | 17 | +466.67 |
| Computran Computer Corp. | 7/2/68 | 2.35 | 10 1/2 | +346.81 |
| Comcet, Inc. | 10/15/68 | 10 | 43 | +330.00 |
| Informative Computer Services, Ltd. | 8/8/68 | 4 | 15 1/2 | +287.20 |
| General Computing Corp. | 11/14/68 | 5 | 19 1/4 | +285.00 |
| Data Lease Financial Corp. | 10/4/68 | 12 | 46 | +283.33 |
| Micropac Industries, Inc. | 10/30/68 | 2 1/2 | 9 1/2 | +280.00 |
| Misarc Computers, Ltd. | 8/22/68 | 5 | 17 | +240.00 |
| Computer Transceiver Systems, Inc. | 12/12/68 | 10 | 30 | +200.00 |
| Central Data Systems, Inc. | 10/17/68 | 6 1/2 | 19 1/4 | +196.15 |
| Computer Communications, Inc. | 10/17/68 | 12 1/2 | 37 | +196.00 |
| Document Systems, Inc. | 11/6/68 | 3 1/2 | 10 | +185.71 |
| Data Technology Corp. | 8/27/68 | 14 | 39 1/2 | +182.14 |
| Programming Methods, Inc. | 12/5/68 | 6 | 16 1/2 | +175.00 |
| Elba Systems Corp. | 12/19/68 | 35 | 93 | +165.71 |
| Cybermatics, Inc. | 8/22/68 | 5 | 13 1/2 | +165.00 |
| SYS Associates, Inc. | 9/24/68 | 5 | 13 1/2 | +165.00 |
| International Computing Ser., Inc. | 7/8/68 | 4 | 10 1/4 | +156.25 |
| Central Computing, Inc. | 12/16/68 | 3 | 7 5/8 | +154.17 |
| Electronic Data Systems Corp. | 9/12/68 | 16 1/2 | 41 1/2 | +151.52 |
| Info. & Comm. Applications, Inc. | 8/16/68 | 4 | 9 1/2 | +137.50 |
| On-Line Systems, Inc. | 9/5/68 | 11 | 24 | +118.18 |
| Datapax Computer Systems Corp. | 11/25/68 | 5 | 10 3/4 | +115.00 |
| Computer Studies, Inc. | 11/26/68 | 5 | 10 3/4 | +115.00 |
| Infotec, Inc. | 12/10/68 | 5 | 10 3/4 | +115.00 |
| Data Systems Analysts, Inc. | 7/12/68 | 5 | 10 1/2 | +110.00 |
| Fedder Data Centers, Inc. | 9/12/68 | 4 1/2 | 9 1/4 | +105.56 |
| Computer Installations Corp. | 12/17/68 | 10 | 19 3/4 | + 97.50 |
| General Computer Services, Inc. | 7/30/68 | 5 | 9 1/2 | + 90.00 |
| Faim Information Services, Inc. | 10/31/68 | 2 | 3 3/4 | + 87.50 |
| SSI Computer Corp. | 10/31/68 | 17 | 30 | + 76.47 |
| Computer Time Sharing Corp. | 12/17/68 | 12 | 20 1/2 | + 70.83 |
| Northeast Computer Institute, Inc. | 10/11/68 | 2 | 3 3/8 | + 68.71 |
| Data Network Corp. | 10/10/68 | 10 1/4 | 17 | + 65.85 |
| United Data Centers, Inc. | 7/19/68 | 6 | 9 3/4 | + 62.50 |
| Anathon Com. & Education Sys., Inc. | 7/26/68 | 7 | 11 1/4 | + 60.71 |
| URS Systems Corp. | 8/1/68 | 20 | 31 1/4 | + 56.25 |
| Datascan, Inc. | 10/17/68 | 12 1/2 | 17 3/4 | + 42.00 |
| Anacomp, Inc. | 12/17/68 | 7 | 9 3/4 | + 39.28 |
| Telecredit, Inc. | 7/19/68 | 29 1/2 | 41 | + 38.94 |
| Data Architects, Inc. | 12/3/68 | 11 | 15 | + 36.36 |
| KPA Computer Techniques, Inc. | 11/21/68 | 6 | 8 | + 33.33 |
| EDP Resources, Inc. | 10/1/68 | 20 | 26 | + 30.00 |
| Log Etronics, Inc. | 11/21/68 | 23 | 28 | + 21.73 |
| Micromation Technology Corp. | 12/12/68 | 20 | 23 | + 15.00 |
| Programming Techniques, Inc. | 12/16/68 | 5 | 5 3/4 | + 15.00 |
| Dearborn Computer Corp. | 9/20/68 | 45 | 50 1/2 | + 12.22 |
| Scotco Data Leasing, Inc. | 10/3/68 | 6 | 6 1/2 | + 8.33 |
| Base Ten Systems, Inc. | 10/22/68 | 6 | 6 1/2 | + 8.33 |
| Dynation Corp. | 12/31/68 | 6 | 6 1/2 | + 8.33 |
| Tabulating & Data Processing | 9/12/68 | 7 1/2 | 8 | + 6.66 |
| Di-An Controls, Inc. | 11/21/68 | 8 | 8 1/2 | + 6.25 |
| Topas Computer Corp. | 10/18/68 | 8 3/4 | 9 | + 2.86 |
| Dialscan Systems, Inc. | 8/5/68 | 5 | 5 | 0.0 |
| Time Share Corp. | 11/8/68 | 11 | 11 | 0.0 |
| Cognitronics Corp. | 9/27/68 | 39 | 37 | - 5.13 |
| Intercontinental Systems, Inc. | 11/26/68 | 15 | 14 | - 6.67 |
| Astrosystems International, Inc. | 10/3/68 | 11 | 10 1/4 | - 6.82 |
| Computer Systems Development Corp. | 12/18/68 | 5 | 4 1/2 | - 10.00 |
| Computer Property Corp. | 11/19/68 | 14 | 12 1/2 | - 10.71 |
| Responsive Environments Corp. | 10/7/68 | 32 1/2 | 29 | - 10.77 |
| Unidat Corp. | 9/26/68 | 6 | 5 1/4 | - 12.50 |
| Cyber-tronics, Inc. | 9/26/68 | 13 | 11 1/4 | - 13.46 |
| Numerical Cont. Prog. Education, Inc. | 12/10/68 | 5 | 4 1/4 | - 15.00 |
| American Computer Leasing Corp. | 12/3/68 | 17 1/4 | 14 1/2 | - 15.94 |
| Diversified Data Ser. & Scien., Inc. | 12/17/68 | 15 | 12 1/4 | - 18.33 |
| Diebold Computer Leasing, Inc. | 8/27/68 | 24 1/2 | 19 | - 22.44 |
| Equi Data, Inc. | 12/10/68 | 8 | 6 | - 25.00 |
| Data Probe, Inc. | 10/10/68 | 5 | 3 3/4 | - 25.00 |



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STOCK MARKET RECORD FOR 1968

| NEW YORK STOCK EXCHANGE | 1968 High | 1968 Low | Close 12/29/67 | Close 12/31/68 | Year Net Change | 1968 % Change | 1967 % Change |
|---|---|---|---|---|---|---|---|
| Addressograph-Multigraph | 91 7/8 | 52 | 79 3/8 | 71 3/8 | - 8 | -10.08 | + 60.20 |
| American R & D | 207 | 122 1/2 | 191 | 176 1/4 | -14 3/4 | - 7.72 | +377.50 |
| Ampex Corp. | 42 3/8 | 26 1/2 | 35 5/8 | 39 | + 3 3/8 | + 9.47 | + 48.44 |
| Bunker Ramo | 21 3/8 | 15 | 17 1/8 | 17 3/8 | + 1/4 | + 1.46 | +117.46 |
| Burroughs | 255 | 157 | 185 3/8 | 240 1/2 | +55 1/2 | +29.94 | +111.82 |
| Collins Radio | 101 1/8 | 53 | 99 | 67 1/4 | -31 3/4 | -32.07 | + 69.59 |
| Control Data | 163 1/2 | 124 1/4 | 136 1/2 | 144 1/4 | + 7 3/4 | + 5.68 | +321.62 |
| Electronic Assoc. | 27 3/8 | 18 | 23 | 22 5/8 | - 3/8 | - 1.63 | + 21.21 |
| General Electric | 100 3/8 | 80 1/4 | 96 | 93 | - 3 | - 3.13 | + 8.47 |
| Honeywell | 139 3/4 | 89 3/8 | 108 7/8 | 114 | + 5 1/8 | + 4.71 | + 64.41 |
| +IBM | 375 | 304 1/2 | 313 1/2 | 315 | + 1 1/2 | + 0.48 | + 68.77 |
| ITT | 62 1/2 | 44 7/8 | 58 | 58 1/4 | + 1/4 | + 0.43 | + 59.72 |
| Litton | 104 3/4 | 62 | 104 3/4 | 72 | -32 3/4 | - 3.13 | + 28.73 |
| Memorex | 93 1/2 | 61 1/2 | 92 1/2 | 82 1/4 | - 9 3/4 | -10.54 | +172.06 |
| Nat. Cash Reg. | 154 1/4 | 99 1/2 | 133 3/4 | 115 | -18 3/4 | -16.30 | + 97.78 |
| RCA | 55 | 44 1/4 | 53 3/8 | 46 1/4 | - 7 1/8 | -13.35 | + 24.85 |
| +Raytheon | 54 | 33 1/4 | 52 5/8 | 49 7/8 | - 2 3/4 | - 5.23 | + 98.58 |
| Sanders | 66 1/2 | 41 3/4 | 65 | 59 | - 6 | - 9.23 | +130.08 |
| +Scientific Data | 117 1/2 | 79 3/4 | 90 7/8 | 92 3/4 | + 1 7/8 | + 2.06 | +209.66 |
| SCM | 61 1/4 | 35 3/4 | 54 1/2 | 43 1/4 | -11 1/4 | -20.64 | - 4.17 |
| Singer | 88 7/8 | 62 3/4 | 68 7/8 | 79 1/2 | + 9 5/8 | +13.97 | + 49.73 |
| Sperry Rand | 63 3/8 | 41 3/8 | 63 7/8 | 46 3/8 | -17 1/2 | -27.39 | +148.32 |
| Teledyne | 143 7/8 | 90 1/8 | 139 1/4 | 107 | -32 1/4 | -23.16 | +227.65 |
| TOTALS (ASSUMING ONE SHARE OF EACH STOCK OWNED) | | | 2,262 3/4 | 2,152 1/8 | -110 5/8 | - 4.89 | +87.28 |
| AMERICAN STOCK EXCHANGE | | | | | | | |
| Automatic D P | 75 1/2 | 42 | 64 3/8 | 70 1/8 | + 5 3/4 | + 8.93 | +150.00 |
| Calcomp | 53 1/4 | 26 3/4 | 44 7/8 | 35 3/8 | - 9 1/2 | -21.17 | +194.26 |
| Clary Corp. | 32 3/8 | 12 1/4 | 18 7/8 | 23 3/8 | + 4 1/2 | +23.84 | +371.87 |
| Computer Applications | 42 5/8 | 17 5/8 | 42 1/2 | 19 1/2 | -23 | -54.12 | +193.10 |
| Computer Sciences | 67 3/8 | 31 5/8 | 62 1/4 | 54 1/2 | - 8 | -12.85 | +465.90 |
| Computing and Software | 85 | 43 1/2 | 55 1/2 | 83 1/2 | +28 | +50.45 | ** |
| Data Proc. Fin. & Gen. | 72 1/2 | 46 1/2 | 62 1/8 | 58 1/8 | - 4 | - 6.44 | ** |
| Data Products | 28 7/8 | 17 1/8 | 20 5/8 | 26 7/8 | + 6 1/4 | +30.30 | +768.42 |
| Digital Equipment | 179 | 95 1/4 | 144 1/4 | 173 3/8 | +29 1/8 | +20.19 | +378.84 |
| Elect. Comp. Prog. In. | 51 3/4 | 25 5/8 | 51 | 30 | -21 | -41.18 | ** |
| +Granite Computer | 58 7/8 | 42 1/2 | 35 3/8 | 42 3/4 | + 7 3/8 | +20.85 | ** |
| Greyhound Computer | 43 1/4 | 25 | 35 1/4 | 26 1/8 | - 9 1/8 | -25.89 | ** |
| +Leasco | 143 | 70 3/4 | 68 3/4 | 124 1/2 | +55 3/4 | +81.09 | +298.55 |
| +Levin-Townsend Comp. | 67 3/4 | 47 5/8 | 49 5/8 | 53 1/4 | + 3 5/8 | + 7.30 | +518.75 |
| Milgo Elect. | 52 3/4 | 14 3/8 | 14 1/8 | 27 7/8 | +13 3/4 | +97.35 | +175.61 |
| +Mohawk Data Sciences | 107 1/2 | 58 | 60 | 67 3/4 | + 7 3/4 | +12.92 | +427.13 |
| Planning Research | 63 1/4 | 28 | 43 | 62 | +19 | +44.19 | +333.33 |
| Potter Instrument | 38 1/2 | 20 1/2 | 37 5/8 | 29 1/4 | - 8 3/8 | -22.26 | +173.63 |
| Randolph Computers | 64 | 34 5/8 | 53 7/8 | 40 1/4 | -13 5/8 | -25.29 | +584.13 |
| Sys. Eng. Labs. | 42 5/8 | 26 5/8 | 30 5/8 | 28 7/8 | - 1 3/4 | - 5.71 | +645.45 |
| TOTALS (ASSUMING ONE SHARE OF EACH STOCK OWNED) | | | 994 5/8 | 1,077 3/8 | +82 3/4 | + 8.32 | +280.63 |

| OVER-THE-COUNTER | 1968 High Bid | 1968 Low Bid | 12/29/67 Closing Bid | 12/31/68 Closing Bid | Bid Price Change | 1968 % Price Change | 1967 % Price Change |
|---|---|---|---|---|---|---|---|
| +Applied Data Research, Inc. | 36 | 14 | 25 | 34 | + 9 | +36.00 | +455.55 |
| Aries Corp. | 23 | 13 | 24 1/2 | 16 | - 8 1/2 | -34.69 | +180.00 |
| Bolt, Beranek & Newman, Inc. | 27 | 14 | 28 | 17 1/4 | -10 3/4 | -38.39 | +198.67 |
| Computer Usage | 62 | 28 | 63 | 38 | -25 | -39.68 | +196.47 |
| Cyber-tronics | 19 | 11 | 15 3/4 | 12 | - 3 3/4 | -23.81 | +231.58 |
| Digitronics | 27 | 16 | 22 | 20 | - 2 | - 9.09 | +266.67 |
| DPA, Inc. | 19 | 12 | 16 5/8 | 14 | - 2 5/8 | -15.79 | +315.62 |
| Electronic Memories | 57 | 32 | 48 3/4 | 55 | + 6 1/4 | +12.82 | +297.96 |
| Fabri-Tek | 29 | 9 | 12 1/2 | 12 3/8 | - 1/8 | - 1.00 | +108.33 |
| +Informatics, Inc. | 34 | 16 | 26 1/2 | 27 | + 1/2 | + 1.89 | +583.87 |
| LMC Data, Inc. | 16 | 7 | 15 1/4 | 7 | - 8 1/4 | -54.10 | ** |
| Management Assistance | 16 | 10 | 15 1/8 | 13 1/2 | - 1 5/8 | - 1.07 | + 8.04 |
| Optical Scanning Corp. | 145 | 71 | 94 | 117 | +23 | +24.47 | +232.74 |
| Recognition Equipment, Inc. | 99 | 38 | 84 1/2 | 72 | -12 1/2 | -14.79 | +234.65 |
| Standard Computers | 53 | 30 | 44 | 41 1/2 | - 2 1/2 | - 5.68 | ** |
| Tally Corp. | 51 | 34 | 49 | 31 | -18 | -36.73 | + 75.00 |
| TBS Computer Centers Corp. | 22 | 10 | 18 3/8 | 12 1/2 | - 5 7/8 | -31.97 | +182.69 |
| University Computing | 182 | 57 | 97 | 155 | +58 | +59.79 | +340.00 |
| TOTALS (ASSUMING ONE SHARE OF EACH STOCK OWNED) | | | 699 7/8 | 695 1/8 | - 4 3/4 | - 0.68 | +231.09 |

+ Reflects Stock Dividend or Split



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in EDP/IR.

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF February 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 19 | 2 | 21 | X |
| | 220 | $ 14,000 | 10/58 | 25 | 4 | 29 | X |
| | B100 | $ 2,800 | 8/64 | 107 | 18 | 125 | X |
| | B200 Series | $ 5,500 | 11/61 | 444 | 81 | 525 | X |
| | B300 Series | $ 9,500 | 7/65 | 455 | 100 | 555 | 55 |
| | B500 | $ 3,800 | 11/68 | 14 | 1 | 15 | 75 |
| | B2500 | $ 5,000 | 2/67 | 86 | 19 | 105 | 105 |
| | B3500 | $ 14,000 | 5/67 | 104 | 26 | 130 | 205 |
| | B5500 | $ 26,000 | 3/63 | 89 | 8 | 97 | 20 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 62 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 15 |
| | B8500 | $200,000 | 4/69 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 260 | 10 | 270 | X |
| | G-20 | $ 15,500 | 4/61 | 16 | 2 | 18 | X |
| | LGP-21 | $ 725 | 12/62 | 137 | 3 | 140 | X |
| | LGP-30 | $ 1,300 | 9/56 | 99 | 5 | 104 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 46 | 4 | 50 | X |
| | 160*/160A/160G | $2,100/$5,000/$12,000 | 5/60;7/61;3/64 | 457 | 38 | 495 | X |
| | 924/924A | $ 11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 46 | 3 | 49 | X |
| | 1700 | $ 3,800 | 5/66 | 140 | 60 | 200 | 90 |
| | 3100/3150 | $ 10,500 | 12/64 | 104 | 23 | 127 | 18 |
| | 3200 | $ 14,000 | 5/64 | 44 | 15 | 59 | X |
| | 3300 | $ 20,500 | 9/65 | 114 | 30 | 144 | 19 |
| | 3400 | $ 19,000 | 11/64 | 14 | 4 | 18 | X |
| | 3500 | $ 25,000 | 1/69 | 1 | 0 | 1 | 23 |
| | 3600 | $ 52,000 | 6/63 | 31 | 11 | 42 | X |
| | 3800 | $ 53,000 | 2/66 | 17 | 3 | 20 | X |
| | 6400/6500 | $ 58,000 | 5/66 | 52 | 18 | 70 | 26 |
| | 6600 | $115,000 | 8/64 | 46 | 14 | 60 | 17 |
| | 7600 | $240,000 | 1/69 | 1 | 0 | 1 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 49 | 2 | 51 | X |
| | PDP-4 | $ 1,700 | 8/62 | 40 | 5 | 45 | X |
| | PDP-5 | $ 900 | 9/63 | 90 | 10 | 100 | X |
| | PDP-6 | $ 10,000 | 10/64 | 18 | 3 | 21 | X |
| | PDP-7 | $ 1,300 | 11/64 | 123 | 35 | 158 | X |
| | PDP-8 | $ 525 | 4/65 | 1150 | 260 | 1410 | 20 |
| | PDP-9 | $ 1,100 | 12/66 | 235 | 80 | 315 | 30 |
| | PDP-10 | $ 11,000 | 10/67 | 39 | 9 | 48 | 28 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 70 | 30 | 100 | 18 |
| | 8400 | $ 10,000 | 6/65 | 19 | 6 | 25 | 3 |
| EMR Computer Division | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 17 | 0 | 17 | 1 |
| | ADVANCE 6040 | $ 5,600 | 7/65 | 8 | 3 | 11 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 29 | 6 | 35 | 18 |
| General Electric | 105 | $ 1,350 | 7/69 | 0 | 0 | 0 | 160 |
| | 115 | $ 2,200 | 12/65 | 450 | 650 | 1100 | 170 |
| | 130 | $ 4,500 | 3/69 | 0 | 0 | 0 | 145 |
| | 205 | $ 2,900 | 6/64 | 12 | 0 | 12 | X |
| | 210 | $ 16,000 | 7/59 | 32 | 0 | 32 | X |
| | 215 | $ 6,000 | 9/63 | 20 | 2 | 22 | X |
| | 225 | $ 8,800 | 4/61 | 144 | 20 | 164 | X |
| | 235 | $ 12,500 | 4/64 | 116 | 24 | 140 | 12 |
| | 405 | $ 6,200 | 2/68 | 48 | 12 | 60 | 35 |
| | 415 | $ 11,000 | 5/64 | 321 | 102 | 423 | 25 |
| | 425 | $ 19,500 | 6/64 | 119 | 35 | 154 | 28 |
| | 435 | $ 27,000 | 9/65 | 34 | 9 | 43 | 12 |
| | 625 | $ 54,000 | 4/65 | 31 | 5 | 36 | 8 |
| | 635 | $ 62,000 | 5/65 | 43 | 5 | 48 | 24 |
| | 645 | $ 90,000 | 7/66 | 8 | 0 | 8 | 2 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 81 | 31 | 112 | 60 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 45 | 20 | 65 | 5 |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 19 | 2 | 21 | 3 |
| Hewlett-Packard | 2000A | $ 2,500 | 11/68 | 1 | 0 | 1 | 68 |



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AS OF February 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 72 | 2 | 74 | X |
| | DDP-116 | $ 950 | 4/65 | 204 | 44 | 248 | 13 |
| | DDP-124 | $ 2,150 | 3/66 | 55 | 17 | 72 | 12 |
| | DDP-224 | $ 3,600 | 3/65 | 49 | 10 | 59 | 11 |
| | DDP-516 | $ 780 | 9/66 | 226 | 64 | 290 | 170 |
| | H-110 | $ 2,500 | 9/68 | 29 | 6 | 35 | 90 |
| | H-120 | $ 4,200 | 1/66 | 775 | 195 | 970 | 80 |
| | H-125 | $ 5,000 | 12/67 | 90 | 20 | 110 | 110 |
| | H-200 | $ 9,200 | 3/64 | 830 | 350 | 1180 | 80 |
| | H-400 | $ 8,500 | 12/61 | 72 | 38 | 110 | X |
| | H-632 | $ 3,500 | 12/68 | 3 | 0 | 3 | 35 |
| | H-800 | $ 30,000 | 12/60 | 59 | 14 | 73 | X |
| | H-1200 | $ 11,600 | 2/66 | 236 | 60 | 296 | 60 |
| | H-1250 | $ 12,000 | 8/68 | 22 | 6 | 28 | 75 |
| | H-1400 | $ 14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,500 | 1/66 | 125 | 28 | 153 | 70 |
| | H-4200 | $ 20,500 | 9/68 | 4 | 0 | 4 | 22 |
| | H-8200 | $ 50,000 | 2/69 | 0 | 0 | 0 | 8 |
| IBM | 305 | $ 3,600 | 12/57 | 58 | 22 | 80 | X |
| | 360/20 | $ 2,800 | 12/65 | 5800 | 4000 | 9800 | 2700 |
| | 360/25 | $ 5,330 | 10/68 | 110 | 30 | 140 | 3600 |
| | 360/30 | $ 8,800 | 5/65 | 6000 | 3400 | 9400 | 700 |
| | 360/40 | $ 16,800 | 4/65 | 2590 | 1060 | 3650 | 500 |
| | 360/44 | $ 15,000 | 7/66 | 265 | 55 | 320 | 65 |
| | 360/50 | $ 32,000 | 8/65 | 1045 | 235 | 1280 | 650 |
| | 360/65 | $ 60,000 | 11/65 | 500 | 96 | 596 | 270 |
| | 360/67 | $138,000 | 6/66 | 42 | 10 | 52 | 50 |
| | 360/75 | $ 81,400 | 1/66 | 34 | 8 | 42 | 11 |
| | 360/85 | $115,000 | 10/69 | 0 | 0 | 0 | 23 |
| | 360/90 Series | $150,000 | 11/67 | 10 | 0 | 10 | 9 |
| | 650 | $ 4,800 | 11/54 | 75 | 25 | 100 | X |
| | 1130 | $ 1,700 | 2/66 | 3175 | 1275 | 4450 | 2200 |
| | 1401 | $ 6,200 | 9/60 | 2950 | 1950 | 4900 | X |
| | 1401-G | $ 2,300 | 5/64 | 590 | 610 | 1200 | X |
| | 1401-H | $ 1,300 | 6/67 | 240 | 180 | 420 | X |
| | 1410 | $ 17,000 | 11/61 | 322 | 188 | 510 | X |
| | 1440 | $ 4,100 | 4/63 | 1670 | 1240 | 2910 | X |
| | 1460 | $ 9,800 | 10/63 | 605 | 115 | 720 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 860 | 470 | 1330 | X |
| | 1800 | $ 5,000 | 1/66 | 445 | 160 | 605 | 260 |
| | 7010 | $ 26,000 | 10/63 | 127 | 21 | 148 | X |
| | 702 | $ 6,900 | 2/55 | 3 | 0 | 3 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 16 | 2 | 18 | X |
| | 7040 | $ 25,000 | 6/63 | 66 | 44 | 110 | X |
| | 7044 | $ 36,500 | 6/63 | 64 | 22 | 86 | X |
| | 705 | $ 38,000 | 11/55 | 29 | 5 | 34 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 156 | 84 | 240 | X |
| | 7080 | $ 60,000 | 8/61 | 77 | 3 | 80 | X |
| | 709 | $ 40,000 | 8/58 | 2 | 0 | 2 | X |
| | 7090 | $ 63,500 | 11/59 | 30 | 6 | 36 | X |
| | 7094 I/II | $ 77,300 | 9/62;4/64 | 187 | 13 | 200 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 20 | 2 | 22 | X |
| | NCR-310 | $ 2,500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $ 9,000 | 5/62 | 534 | 276 | 810 | 22 |
| | NCR-315-RMC | $ 12,500 | 9/65 | 95 | 23 | 118 | 15 |
| | NCR-390 | $ 1,950 | 5/61 | 980 | 470 | 1450 | X |
| | NCR-500 | $ 1,650 | 10/65 | 1705 | 785 | 2490 | 280 |
| | Century-100 | $ 2,645 | 9/68 | 75 | 5 | 80 | 820 |
| | Century-200 | $ 7,500 | 4/69 | 0 | 0 | 0 | 500 |
| Philco | 1000 | $ 7,010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210, 211 | $ 40,000 | 10/58 | 12 | 1 | 13 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,500 | 2/61 | 396 | 205 | 601 | X |
| | RCA 3301 | $ 19,000 | 7/64 | 78 | 8 | 86 | X |
| | RCA 501 | $ 14,000 | 6/59 | 75 | 2 | 77 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,500 | 9/65 | 120 | 80 | 200 | 25 |
| | Spectra 70/25 | $ 7,200 | 9/65 | 75 | 40 | 115 | 25 |
| | Spectra 70/35 | $ 8,400 | 1/67 | 110 | 75 | 185 | 80 |
| | Spectra 70/45 | $ 24,000 | 11/65 | 225 | 75 | 300 | 50 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 1 | 0 | 1 | 5 |
| | Spectra 70/55 | $ 35,000 | 11/66 | 14 | 3 | 17 | 10 |
| Raytheon | 250 | $ 1,200 | 12/60 | 115 | 45 | 160 | X |
| | 440 | $ 3,500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $ 3,200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp. | 655 | $ 1,800 | 10/66 | 67 | 0 | 67 | 9 |
| | 660 | $ 2,000 | 10/65 | 11 | 0 | 11 | 2 |
| | 670 | $ 2,600 | 5/66 | 1 | 0 | 1 | 0 |
| | 4700 | $ 800 | 2/69 | 0 | 0 | 0 | 24 |
| | 6700 | $ 16,000 | 11/69 | 0 | 0 | 0 | 1 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 65 | 5 | 70 | X |
| | SDS-910 | $ 2,000 | 8/62 | 175 | 15 | 190 | X |
| | SDS-920 | $ 2,900 | 9/62 | 140 | 20 | 160 | X |
| | SDS-925 | $ 3,000 | 12/64 | 23 | 2 | 25 | X |
| | SDS-930 | $ 3,400 | 6/64 | 145 | 20 | 165 | X |
| | SDS-940 | $ 25,000 | 4/66 | 40 | 2 | 42 | 18 |
| | SDS-9300 | $ 8,500 | 11/64 | 31 | 2 | 33 | X |
| | Sigma 2 | $ 1,800 | 12/66 | 138 | 22 | 160 | 145 |
| | Sigma 5 | $ 7,000 | 8/67 | 54 | 18 | 72 | 65 |
| | Sigma 7 | $ 13,500 | 12/66 | 41 | 10 | 51 | 22 |
| Standard Computer Corp. | IC6000 | $ 18,000 | 5/67 | 14 | 0 | 14 | 11 |
| | IC4000 | $ 10,000 | 9/68 | 3 | 0 | 3 | 5 |
| Systems Eng Labs | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810 A/B | $900/$1,100 | 8/66;9/68 | 147 | 11 | 158 | 50 |
| | 840 | $ 1,400 | 11/65 | 4 | 0 | 4 | X |
| | 840 A/MP | $1,400/$1,600 | 8/66;10/67 | 58 | 2 | 60 | 25 |
| UNIVAC | I & II | $ 25,000 | 3/51 & 11/57 | 17 | 0 | 17 | X |
| | III | $ 21,000 | 8/62 | 72 | 13 | 85 | X |
| | File Computers | $ 15,000 | 8/56 | 8 | 0 | 8 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 103 | 70 | 173 | X |
| | 418 | $ 11,700 | 6/63 | 102 | 52 | 154 | 12 |
| | 490 Series | $ 32,000 | 12/61 | 179 | 26 | 205 | 25 |
| | 1004 | $ 1,900 | 2/63 | 1710 | 1000 | 2710 | X |
| | 1005 | $ 2,550 | 4/66 | 928 | 422 | 1350 | 45 |
| | 1050 | $ 8,800 | 9/63 | 175 | 90 | 265 | X |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1107 | $ 57,000 | 10/62 | 19 | 8 | 27 | X |
| | 1108 | $ 68,000 | 9/65 | 128 | 47 | 175 | 108 |
| | 9200 | $ 1;600 | 6/67 | 297 | 93 | 390 | 565 |
| | 9300 | $ 3,600 | 9/67 | 158 | 52 | 210 | 450 |
| | 9400 | $ 7,000 | 5/69 | 0 | 0 | 0 | 120 |
| | LARC | $135,000 | 5/60 | 1 | 0 | 1 | X |
| | | | TOTALS | 47,275 | 22,172 | 69,447 | 17,028 |



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March 24, - April 4, 1969

| | 1969 High | 1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| **NEW YORK STOCK EXCHANGE** | | | | | | | | |
| Addressograph-Multigraph | 76 7/8 | 65 1/4 | 1042 | 76 7/8 | 69 3/8 | 74 1/2 | + 5 1/8 | + 7.39 |
| American R & D | 182 1/2 | 154 1/2 | 144 | 176 7/8 | 172 1/4 | 172 1/4 | - 3 | - 1.71 |
| Ampex Corp. | 39 3/4 | 32 1/2 | 1768 | 39 3/4 | 36 7/8 | 37 3/4 | + 1/4 | + 0.67 |
| Bunker Ramo | 17 5/8 | 12 7/8 | 1789 | 13 5/8 | 12 7/8 | 12 7/8 | - 3/4 | - 5.50 |
| +Burroughs | 125 3/4 | 125 1/4 | 1041 | 125 3/4 | 123 1/8 | 125 3/8 | + 3 3/8 | + 2.77 |
| Collins Radio | 69 3/4 | 48 | 3105 | 63 5/8 | 58 5/8 | 59 3/4 | + 9 3/8 | +18.61 |
| Computer Sciences | 65 1/2 | 49 | 960 | 63 7/8 | 58 3/4 | 60 1/4 | - 1 1/2 | - 2.55 |
| Control Data | 152 3/4 | 125 1/8 | 2928 | 141 3/4 | 136 1/4 | 137 5/8 | + 2 | + 1.45 |
| Electronic Assoc. | 25 1/4 | 19 3/8 | 418 | 21 1/2 | 19 3/8 | 20 1/8 | + 1/8 | + 0.62 |
| General Electric | 96 1/4 | 85 1/8 | 3288 | 93 | 88 | 90 3/8 | + 1 | + 1.12 |
| Honeywell | 130 1/4 | 107 3/4 | 900 | 130 1/4 | 123 1/4 | 124 1/4 | - 2 | - 1.58 |
| IBM | 316 | 291 3/4 | 1392 | 316 | 305 1/4 | 310 3/4 | + 5 1/4 | + 1.72 |
| ITT | 58 1/2 | 48 1/8 | 2531 | 54 | 50 1/8 | 51 1/4 | - 1 3/8 | - 2.61 |
| Litton | 74 1/2 | 48 1/4 | 1940 | 53 1/4 | 49 5/8 | 50 | + 3 3/8 | - 6.32 |
| Memorex | 82 5/8 | 65 | 784 | 80 | 74 1/2 | 75 5/8 | - 5/8 | - 0.82 |
| National Cash Register | 129 3/4 | 108 | 1222 | 129 3/4 | 120 1/2 | 122 | - 1/8 | - 0.10 |
| RCA | 48 1/8 | 41 1/4 | 3239 | 44 | 41 1/4 | 43 3/4 | + 1 1/4 | + 2.94 |
| Raytheon | 50 1/4 | 38 | 1353 | 40 7/8 | 38 1/2 | 39 7/8 | + 5/8 | + 1.59 |
| Sanders | 61 7/8 | 40 | 1460 | 45 3/8 | 40 3/4 | 45 3/8 | + 4 3/8 | +10.67 |
| Scientific Data | 119 3/4 | 83 | 1445 | 117 3/4 | 112 1/4 | 112 5/8 | - 1 1/8 | - 0.99 |
| SCM | 47 1/8 | 38 | 880 | 42 | 38 3/4 | 40 | + 1/4 | + 0.63 |
| Singer | 84 1/4 | 71 3/4 | 685 | 80 1/4 | 75 | 76 3/4 | + 1 1/2 | + 1.99 |
| Sperry Rand | 54 | 44 1/4 | 3709 | 53 5/8 | 50 3/8 | 51 | + 1/2 | + 0.99 |
| +Teledyne | 45 1/2 | 40 1/8 | 697 | 44 7/8 | 41 1/2 | 42 1/8 | - 1 | - 2.32 |
| Xerox | 272 1/8 | 251 3/4 | 990 | 256 7/8 | 251 3/4 | 251 3/4 | - 4 1/4 | - 1.67 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 0.64 | + 1.08 |
| + Stock Split | | | | | | | | |
| **AMERICAN STOCK EXCHANGE** | | | | | | | | |
| Automatic DP | 77 1/4 | 63 1/4 | 243 | 72 3/8 | 68 3/8 | 71 3/4 | + 3 3/4 | + 5.51 |
| Calcomp | 37 1/2 | 31 1/8 | 287 | 34 7/8 | 32 1/8 | 32 3/4 | - 1/4 | - 0.76 |
| Clary Corp. | 25 3/4 | 19 5/8 | 248 | 22 1/4 | 19 5/8 | 19 3/4 | - 1 1/8 | - 5.39 |
| Computer Applications | 21 7/8 | 16 3/8 | 192 | 17 5/8 | 16 1/2 | 16 1/2 | - 1 3/8 | - 7.69 |
| +Computing and Software | 50 1/2 | 37 | 412 | 50 1/2 | 41 1/8 | 47 1/2 | + 7 3/8 | +18.32 |
| Data Proc. Fin. & Gen. | 60 1/4 | 44 1/2 | 835 | 51 5/8 | 46 3/4 | 49 1/8 | + 2 | + 4.24 |
| Data Products | 27 7/8 | 17 3/4 | 537 | 19 1/4 | 18 3/8 | 18 3/8 | - 7/8 | - 4.55 |
| Digital Equipment | 175 1/4 | 138 1/2 | 204 | 163 1/4 | 156 1/4 | 160 | + 2 3/8 | + 1.51 |
| Elect. Comp. Prog. In. | 38 1/4 | 27 | 392 | 33 1/8 | 27 | 28 1/4 | - 4 1/8 | -12.74 |
| Granite Computer | 45 1/2 | 32 1/4 | 267 | 36 1/4 | 33 1/4 | 33 3/4 | - 1 7/8 | - 5.26 |
| Greyhound Computer | 28 5/8 | 21 | 147 | 22 3/4 | 21 1/2 | 21 5/8 | - 5/8 | - 2.81 |
| Leasco | 54 | 36 | 4539 | 46 | 40 3/4 | 42 | - 1 | - 2.33 |
| Levin-Townsend Comp. | 57 1/2 | 36 3/4 | 1467 | 41 1/4 | 36 3/4 | 37 1/2 | - 3 1/8 | - 7.69 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 213 | 24 3/4 | 21 3/4 | 22 3/8 | - 1 5/8 | - 6.77 |
| Mohawk Data Sciences | 79 | 59 3/4 | 922 | 79 | 70 3/4 | 74 1/4 | + 1 1/4 | + 1.71 |
| Planning Research | 30 3/4 | 23 7/8 | 626 | 30 3/4 | 27 1/2 | 30 1/2 | + 2 5/8 | + 0.94 |
| Potter Instrument | 35 3/4 | 27 1/8 | 413 | 31 5/8 | 29 1/2 | 30 1/4 | - 3/8 | - 1.22 |
| Randolph Computers | 43 7/8 | 30 5/8 | 630 | 33 | 30 5/8 | 31 5/8 | - 1 1/8 | - 3.44 |
| Sys. Eng. Labs. | 31 3/4 | 26 1/8 | 626 | 31 1/4 | 30 | 30 | - 1 1/8 | - 3.61 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 0.50 | - 1.69 |
| + Stock Split | | | | | | | | |

| | 1968 High Bid | 1968 Low Bid | April 4, Bid | April 4, Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| **OVER-THE-COUNTER** | | | | | | | |
| Applied Data Research, Inc. | 36 1/2 | 31 | 35 | 37 | 31 | + 4 | +12.90 |
| Aries Corp. | 19 | 8 1/2 | 10 | 11 | 8 1/2 | - 1 1/2 | -17.64 |
| Bolt, Beranek & Newman, Inc. | 19 | 14 1/2 | 16 1/2 | 17 1/2 | 14 1/2 | + 2 | +13.79 |
| Computer Usage | 40 | 31 | 33 | 34 1/2 | 33 | -- | -- |
| Cyber-tronics | 12 1/2 | 9 1/8 | 11 3/4 | 12 1/4 | 9 3/4 | + 2 | +20.51 |
| Digitronics | 22 1/2 | 15 | 17 | 18 | 17 1/2 | - 1/2 | - 2.86 |
| DPA, Inc. | 16 1/4 | 10 3/8 | 12 | 12 3/8 | 10 7/8 | + 1 1/8 | +10.34 |
| Electronic Memories | 62 | 46 | 55 1/2 | 56 1/2 | 47 3/4 | + 7 3/4 | +16.23 |
| Fabri-Tek | 12 7/8 | 10 1/2 | 11 7/8 | 12 3/8 | 12 | - 1/8 | - 1.04 |
| Informatics, Inc. | 34 | 16 | 22 | ** | 21 | + 1 | + 4.76 |
| LMC Data, Inc. | 8 1/4 | 5 1/2 | 5 1/2 | 6 1/4 | 6 | - 1/2 | - 8.33 |
| Management Assistance | 14 7/8 | 8 5/8 | 10 | 10 3/8 | 10 1/2 | - 1/2 | - 4.76 |
| Optical Scanning Corp. | 118 | 55 | 55 | 59 | 71 | -16 | -22.54 |
| Recognition Equipment, Inc. | 76 | 54 | 67 1/2 | 68 1/2 | 64 | + 3 1/2 | + 5.47 |
| Tally Corp. | 36 | 22 | 25 1/2 | 27 | 22 | + 3 1/2 | +15.91 |
| TBS Computer Centers Corp. | 17 | 11 | 17 | 18 1/2 | 14 | - 3 | -21.43 |
| University Computing | 155 | 95 | 97 | 100 | 105 | - 8 | - 7.62 |



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EDP industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 1969 SPECIAL REPRINT

# THE COMPUTER INDUSTRY AND ANTITRUST

During the closing days of 1968 and the opening days of 1969, the International Business Machines Corp. was sued by the U.S. Department of Justice and two companies in the data processing industry. A few months later, another major suit was filed . . . and once again there were suggestions that many other companies might rush to the courts.

There is no doubt but that these developments -- even though they had been anticipated by most observers -- mark the opening of a new phase of development within the computer industry. Before this litigation is settled, much more will be known about the economics of the computer industry . . . and the economics may well be changed by the settlements of the various cases.

To provide background on which to evaluate future legal developments within the computer industry, EDP Industry Report commissioned Boston attorney Robert P. Bigelow to discuss the cases pending and the legislation upon which they are based. Here is the text of the speech made by Mr. Bigelow on February 27, 1969.

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Last year Nicholas Johnson, a member of the Federal Communications Commission, discussed the rule of regulation and competition in tomorrow's communications industries. He commenced his commentary by recounting the story of the captain of one of our new-fangled jetliners who, after the ship had been airborne for some two hours, came on the intercom and said: "I have two announcements to make – a bit of good news and a bit of bad news. First, the bad news: We're off course and appear to be lost. The good news is that we have a tail wind and are making very good time." Johnson went on to say: "That is very much the FCC's position in the Communications industry. We haven't the slightest notion where we're going (or, even where we want to go) – but we know we're getting there a whole lot faster than ever before."

The difference between the communications industry and the computer industry is like the difference between the 707 and the SST. The computer industry is moving a lot faster. We heard this morning about the prospects for computers – hardware, software and support. I have been asked to comment on the regulatory aspects of the industry and particularly on the antitrust actions which have been started against IBM.

As the industry has developed, IBM – perhaps more than in many industries – has served as the father under whose protecting arm the children have been nurtured. Now the children are teenagers . . . and you all know what that means. But IBM has not necessarily been a perfect parent. I imagine that more than one of you has been driving along with children in the back seat and been pulled in by a cop for exceeding the speed limit, or for going through a stop sign; the Attorney General has suggested that IBM may have some of the faults of a human father.

So far, three antitrust cases have been brought against IBM. The first, by a competitor – Control Data Corporation in Minnesota. The second by a leasing company – Data Processing Financial and General here in the Federal Court House in Foley Square. The third is the Justice Department's Civil Antitrust case, also downtown. All three of these cases are primarily actions under Section 2 of the Sherman Act, though the DPF&G case also claims violations of other acts. Let us take a look at the Sherman Act since it is one which is common to all three cases: The Supreme Court has said:

> The Sherman Act was designed to be a comprehensive charter of economic liberty aimed at preserving free and unfettered competition as the rule of trade. It rests on the premise that the unrestrained inter-action of competitive forces will yield the best allocation of our economic resources, the lowest prices, the highest quality and the greatest material progress, while at the same time providing an environment conducive to the preservation of our democratic political and social institutions. But even were that premise open to question, the policy unequivocally laid down by the Act is competition.

The Sherman Act established our basic antitrust policy and was passed, as you will recall, in 1890 in response to the general public fear over the great business trusts and combines of the period, which threatened to dominate and control our economy. The other acts – Clayton, Robinson-Patman, Federal Trade Commission – are really supplements to the Sherman Act. Antitrust policy provided for both public and private relief. The Federal Government can bring either criminal or civil suits, both of which can penalize for previous violations. Federal civil cases can also prohibit continuing violations of the antitrust laws. On the private or non-governmental side, someone who has been injured by a violation of the antitrust laws can sue the violator for the damages which he suffered and can also recover twice those actual damages as a penalty. Furthermore, the plaintiff in such a case can get his lawyer's fees, which can be substantial. For example, DPF&G has estimated that this suit could cost it a million dollars. A healthy proportion of that cost will be attorney's fees.

Let us take a look now at Section 2 of the Sherman Act which is involved in all three cases. Section 2 reads:

> Every person who shall monopolize, or attempt to monopolize, combine, or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several states, or with foreign nations, shall be deemed guilty of a misdemeanor.



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This Section proscribes three distinct acts: actual monopolization, attempts to monopolize, and combinations and conspiracies to monopolize. Essential to each is the offense of "monopoly power" for monopolization. The existence of monopoly power must be shown; for attempts or combinations or conspiracies to monopolize, potential existence of monopoly must be shown.

Three years ago the Supreme Court said:

> The offense of monopoly under Section 2 of the Sherman Act has two elements: (l) the possession of monopoly power in the relevant market and (2) the willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident.

Monopoly power is generally defined as the power or ability to fix or control prices in a market or to exclude competition from a market. The relevant market may be defined geographically, or by product or service . . . The concept of relevant market seems to depend on whether the "Market is composed of products that have reasonable interchangeability for the purposes for which they are produced – price, use and quality."

If the defendant can show that the relevant market in which the products he sells are reasonably interchangeable, and he has only a percentage of that market, his position is much improved. However, there has been a definite tendency recently to find a lack of interchangeability and thus to make many small markets rather than one large. For example, championship boxing as opposed to professional boxing in general has been found to constitute a relevant market for Sherman Act purposes.

In what is probably the most important Section 2 case in the last fifteen years, the Grinnell Company "was held to have an unlawful monopoly on the basis of finding that it controlled 87% of the insurance company accredited central station protective service market." This was despite the fact that there were differences between burglar alarm services, fire alarm services, and water flow alarms. And despite Grinnell's showing that persons seeking protective services had many substitutes or alternate sources – such as watchmen and watchdogs.

The Department of Justice has defined the relevant market in its case against IBM as "the general purpose digital computer market;" a general-purpose digital computer is defined as "one which has general commercial application and is offered for sale or lease in standard model configurations."

Control Data, on the other hand, first defines three major markets: computer manufacture and distribution in the United States, computer manufacture and distribution abroad, and thirdly, the combination of the first two. It then goes on to say: "Within each of said three markets exist several product submarkets, identifiable on the basis of unique requirements or preferences of the customers in such submarkets." Control Data identifies the submarkets as involving differing capacity and processing speed, differing application or mode or operation, and the combinations thereof. DPF&G also accents the submarket approach but only by example.

How much of the market must a defendant control in order to be guilty of monopoly? The test is "whether defendant controls the price and competition in the market for such part of trade or commerce as it is charged with monopolizing." In the Grinnell case, the finding of monopoly was justified by 87%; in the boxing case, 81%, and there is a hint in the DuPont case that 75% of the relevant market would have been enough. The Justice Department claims that IBM's total revenues in the general-purpose computer market varied from 69 to 80% in the period 1961-1967. And that its total 1967 revenues in that market were 74% and its shipments 76%.

Control Data says: "Given its donimant position in the computer markets over the years, defendant IBM's shares of many computer submarkets have approached and even exceeded 90%." DPF&G says: "Some 77% of those installations which manufacturers rent for between $5,000 and $75,000 per month were manufactured by IBM; during the first six months of 1968 IBM equipment accounted for some 84% of the increase in electronic data processing equipment installations in this category."

What does all this mean? Whether or not the Justice Department can prove its allegations about monopoly in the general-purpose digital market, it may be possible for one of the other plaintiffs to prove monopolization in a submarket, particularly under some of the Control Data allegations about monopoly abroad. The Sherman Act prohibits activities abroad by American nationals where there is such substantial anti-competitive effects upon our foreign commerce. The Justice Department has not raised the foreign trade question in its current case although it did in the earlier ones. But Control Data has. And its discussion of IBM's share of the market since 1962 speaks in terms of worldwide installations. I have heard it said that, in some places, such as the Middle East, one uses an IBM computer or does not bother to use one. If this is a fact, it raises the possibility that other manufacturers who have considerable interest in overseas marketing might consider some sort of an action in the foreign trade area.

You will recall that in order to prove monopoly it was necessary to show a "wilful acquisition or maintenance of" monopoly power. It has been held that when the Government has shown what the relevant market is, and

that the defendant has captured a sufficient percentage of that market, a rebuttable presumption arises that the defendant had monopoly power and used it in violation of Section 2.

Such a rebuttable presumption may take care of the government's need to prove willfulness or deliberateness in acquiring or using monopoly power. In the private cases – as opposed to the Government case – the decisions have so far uniformly required the plaintiff who brings the case to prove the deliberateness of the defendant's monopolistic action.

The Government case is probably the most important of the three. The attitude of the Justice Department may perhaps be explained by a comment made by former Antitrust Chief Donald Turner, when he said: "My concern in the monopoly is with the company whose monopoly position has been legitimately obtained, but which seems likely to be invulnerable to effective competition for the foreseeable future, unless the company permits the entry and growth of competitors by deliberately holding back . . . . We may at times be faced with continuing monopoly power in an extremely important industry, and I would not foreclose the possibility of seeking an antitrust solution."

While there may have been some political overtones in bringing the case – and there probably were in timing its being filed two days before Nixon was inaugurated – it is also true that at the lower echelons of the Justice Department, where the real work is done on a case of this nature, politics is inclined to drop out of the picture and idealism still holds some sway. And the young men who worked on this case for two years certainly wanted to see it come to some sort of public fruition.

Let's look at how the Government claims IBM has acted illegally. These break down into two categories: discriminatory practices and preventing competition. In the first the Government says that IBM by its policy of quoting a single price for hardware, software and related support, treated some customers better than others.

The Government also says that IBM's policy in providing discounts to universities and other educational institutions was discriminatory.

A third area in which the Government claims discrimination is in the way IBM uses special allowances, buybacks of computer time, and research grants.

Turning to the allegations about preventing competition, the Government claims that the single pricing policy limited development of independent software and service companies, and that IBM accumulated software routines and support and used its tremendous facilities in these areas to stop competitors from selling to IBM customers. The Attorney General also claims that IBM prevented competition by using loss leaders and by marketing its computers long before they were ever put together, thus persuading potential customers to deal with IBM and not with other manufacturers.

One item which has been discussed considerably throughout the computer industry and, recently, particularly with reference to possible antitrust implications, is the custom indulged in by practically all computer manufacturers of requiring the hardware buyer to also take the manufacturer's software, whether he wants it or not. This is sometimes called bundling. As John Breyer pointed out, there are three types of software: the first relates very much to the way the various parts of the machine interacts internally and is practically essential to the operation of any computer. There is general agreement that this type of software is useful and should be provided by the manufacturer as part of the machinery. Secondly, there are the utility routines which run the computer for various standard types of actions. Thirdly, there are the application programs which are designed to do a specific job on a specific machine. This might be a payroll on a model 360/30. The independent software house has had its major impact in this third area and to some degree in the second area. It has been customary among manufacturers to provide software for all three types as part of the package and IBM in particular has built up a tremendous library of applications routines. Because these routines are perhaps not as efficient as those developed by the independents, the latter have had considerable success, for users have found it cheaper to buy independently developed software and use less computer time than to use the routines developed by the manufacturer. But the customer pays, directly or indirectly, for all the routines the manufacturer has available, whether used or not. IBM may be changing its software marketing. Five days before Control Data started its suit, IBM announced that it was considering, among other things, a change in its pricing policy for hardware and software, and it would reach a decision by the first of July.

The Control Data suit does not get into bundling, which is not surprising since CDC and IBM are in the same bed on this practice. But the DPF&G and the Justice Department cases do. Justice says the single price approach discriminates among customers and limits the development of the independent software industry. While the Attorney General's complaint does not spell out how this has been done, the allegations in the DPF&G case suggest some possibly discriminatory practices such as withholding newly developed software from people who do not get their computer directly from IBM.

DPF&G goes beyond Section 2 of the Sherman Act and claims that the separate pricing policy is a tie-in sale and as such is prohibited as a contract in restraint of trade under Section 1 of the Sherman Act, and Section 3 of the Clayton Act. The tie-in allegation has been bouncing around the industry for the last year or so – kicked-off by a young man named David Bender in an article in the Columbia Law Review and by the efforts of Dick Jones, the president of one of the independent software houses, who complained about bundling to the Justice Department around a year ago.

There may be some validity to the tie-in claim. One of the major problems of the 1932 and 1952 antitrust cases involved a requirement that customers purchase their IBM card requirements from IBM. Both the 1932 and 1956 decrees specifically prohibited such a requirement. Yet in 1969, in what appears to many to be an analogous situation, no such claim has been made in the Attorney General's action. One reason may be that a tie-in arrangement requires two distinct products and it can be argued that an application package for a 360 model 20 is not distinct from the Model 20 itself because the package cannot be used with another computer. Without wanting to get into a discussion of application packages written in common programming languages such as Fortran and Cobol, and how this may lead to programs which will run on computers of different manufacturers who have met certain standardization requirements of the Federal Government, it can be argued that if an application program can be written by any of a hundred different companies, it is a separate product from the machine on which it runs.

A case decided in 1960 and affirmed by the Supreme Court in 1961 considered the question of tie-in sales in the electronics industry. Jerrold Electronics was a CATV manufacturer and distributor and refused to sell its systems except with a service contract; it also required purchasers to get any additional equipment to be added to this system from Jerrold. It was held that the service contract tie-in was reasonable when the company started in this new industry, since the satisfactory use of the system could only be assured if Jerrold controlled installation and maintenance. However, the Court held that as the industry grew these reasons disappeared, and the tie-in of the service contract eventually became unlawful. The total value of the tied products which the buyers must take need not be particularly great; something under $61,000 was found sufficient in one case. You have heard the estimates this morning of values in the software industry.

Tie-in sales are an anathema to the antitrust people. If a tie-in sale can be shown, the burden of proof (as a practical matter) passes to the defendant to provide an economic justification. In one case the Supreme Court said: "Since the requisite economic power may be found on the basis of either uniqueness or consumer appeal, and since market dominance in the present context does not necessitate a demonstration of market power in the sense of Section 2 of the Sherman Act, it should seldom be necessary in a tie-in sale case to embark upon a full-scale actual inquiry into the scope of the relevant market for the tying product and into the correlary problem of the seller's percentage share in that market." The American Bar Association, in a recent booklet, expressed it this way: "The fact that the tie-in successfully induced the buyer to take something he did not want will generally suffice to show the requisite economic power over the tying product."

Why have I spent so much time discussing tie-in sales which are alleged in only one of the three cases? Because if tie-in sales can be demonstrated, it may – as a practical matter – prove the economic power to monopolize the computer industry, and the actual monopolization. This could serve as a basis for further antitrust cases by software companies against IBM and possibly against other hardware manufacturers. The question is not clear from doubt, but it is a possibility which must be watched.

I am not going into much detail on the other allegations in the government's complaint. All three complaints have appeared in *Computerworld* and in many ways the private suits amplify what the government is claiming. But some aspects of antitrust law peculiar to the private litigation deserve comment. During the last ten years private antitrust suits have more than doubled in volume, even when the cases which arose out of the electrical equipment brouhaha are excluded. The key statute is Section 4 of the Clayton Act. And it provides "any person who shall be injured in his business or property by reason of anything forbidden in the antitrust laws may sue therefore . . . and shall recover threefold the damages by him sustained . . ." He can also get injunctive relief against continuing violations. "A private plaintiff must establish: first, that a violation of the antitrust laws has in fact occurred; second, that the illegal conduct charged actually caused a business or property injury; and third, the injury suffered is measurable in dollars."

The private litigant's first hurdle – proving the violation of the antitrust laws – is sometimes greatly helped by the provision in Section 5(A) of the Clayton Act which says that a final decree in any civil or criminal proceeding brought by the government under the antitrust laws to the effect that the defendant violated such laws "shall be prima facie evidence against such defendant in any action or proceeding brought by any other party against such defendant." But this does not apply to consent or decrees entered before any testimony is taken. If the private

plaintiff does not have a government decree to lean on, then he must allege and prove that the *public* was injured.

Having established a violation of antitrust laws, the private plaintiff then proceeds to prove *his* business or property was actually injured by the conduct of the defendant. Usually this type of claim is for loss of business and profit. To recover these the plaintiff must "establish with reasonable probability the existence of some causal connection between the defendant's wrongful act and some loss of anticipated revenue."

In private litigation it is necessary to distinguish between the fact that there *was* damage and what that damage amounted to. The plaintiff must show that he was damaged if he is to have any standing to sue at all. But an element of uncertainty as to the dollar amount of his damages will not bar his recovery for the Supreme Court has said: "The constant tendency of the courts is to find some way in which damages can be awarded where a wrong has been done. Difficulty of ascertainment is no longer confused with a right of recovery 'for a proven invasion of the plaintiff's rights.'"

I mentioned earlier that the private plaintiff may be helped by the entry of a decree in the government case. However, the scope of this evidence is determined by rather complicated rules: one part of this statute is designed to encourage defendants in government cases to settle quickly with the government. This is the clause which says that a consent decree entered before testimony is taken is not evidence for the private litigant later. You will notice on page 2 of the 1967 Consent Decree that it is specifically stated that no testimony has been taken. Testimony as it relates to this area means evidence at trial and does not appear to include evidence taken during what is called the discovery phase of litigation, which is when the government takes depositions of IBM. The tendency of the courts recently has been to limit this prohibition against using the final decree whenever possible, because one of the most effective weapons in antitrust is the right of the private person who is injured to recover treble damages.

To help private plaintiffs further, Section 5(B) of the Clayton Act provides that the four year statute of limitations in the usual antitrust case will be suspended – as to all matters which are part of a civil or criminal proceeding instituted by the Federal Government – during the entire period that the Government case is pending and for a year thereafter. This means the private litigant can get hold of evidence the Government has unearthed and placed on public record and use it in his own case. The limitation is that the private antitrust case must be based in whole or in part on some matter which is complained of in the Government case. It doesn't matter how the Government case is terminated – whether by verdict or consent decree – the statute of limitations is still suspended to one year afterwards. The only question is whether the violations are roughly the same.

The Control Data and the Attorney General's suits are both under Section 2 of the Sherman Act and only under that section. The DPF&G suit, as I mentioned earlier, claims that tie-in practices violate Section 1 of the Sherman Act and Section 3 of the Clayton Act.

DPF&G also claims that IBM contracts and practices violate Section 1 of the Sherman Act and also the Robinson Patman Act. It can be debated whether the claimed violations of these other sections can be proved.

Count Five of DPF&G's case is based upon what appears to be a somewhat novel theory. Ordinarily the government is the only proper party to enforce an antitrust decree. Some years ago an attempt was made by people who were not parties to a consent decree between the government and ASCAP to enforce that decree by contempt proceeding. It was held that even though they might derive indirect or economic benefits from the decree and were affected by it, they could not get the court to alter or enforce the terms of that decree since they had not been parties in the case. DPF&G is taking the position that the consent decree entered in 1956 between IBM and the Government is a contract between the two parties for the benefit of the public at large; that DPF&G is a member of the public which was intended to be benefited by the consent decree; that IBM has violated that consent decree (particularly the provisions about reasonable relationships between rental and purchase prices, and other nondiscriminatory aspects of marketing) and that these actions have injured DPF&G. This claim is not an antitrust claim. It is based, rather, on a familiar principle of New York contract law that when A and B make a contract for the benefit of C, C can enforce the contract and recover damages for its breach. Before DPF&G can invoke this principle, it will have to prove that the consent decree of 1956 was a contract. And even if it can, there is another general rule which says that when a contract is made between a governmental body and an individual, the contract must clearly show that the contractor agreed to compensate a third party who was injured by the contractor's failure to live up to his agreement with the Government.

The final cannon in DPF&G's battery is an allegation that IBM acted intentionally to injure DPF&G and that its acts were unfair competition and unlawful interference with advantageous business relationships. Here it claims not only actual damages of $351,500,000, but also punitive damages of one billion dollars. Unfair competition and interference with advantageous relations are fairly common grounds for claiming a *tort* (that is, a civil wrong), but the evidence to prove them can be quite difficult to come by. DPF&G may be aided in this

branch of its case by a doctrine particularly strong in New York which says that if you can't prove a tort in any of the traditional categories, but can show that the defendant's conduct injured you and was intentionally designed to do so, you can recover damages.

Let us now take a look at the relief which has been requested by these various cases. All of them ask that IBM be found to have monopolized in violation of Section 2 of the Sherman Act and (insofar as DPF&G is concerned) the other antitrust sections. The second prayer for relief in each complaint is a request that IBM and its personnel be enjoined from carrying out any agreements which are illegal, or otherwise continuing its illegal conduct. The Government and DPF&G then ask for separate pricing for computers, peripherals, software and customer support; Control Data does not, obviously, request this relief. The Government also specifically requests injunctions against unreasonable special allowances, computer time buy-backs, and research grants . . . premature announcements of hardware and software and the production of hardware loss leaders.

Common to all three complaints is a request for divestiture of IBM. The Government's complaint in 1952 against IBM asked for "such divorcement and divestiture relief . . . of the defendant as the Court may consider necessary or appropriate to dissipate the effects of the defendant's unlawful activities as hereinbefore in this complaint alleged, and to restore competitive conditions to the . . . industry."

The 1969 complaint is almost a word-for-word repetition of the 1952 complaint and is ample to cover up a break up of IBM or (as requested by DPF&G) the spin-off of the leasing, software and maintenance functions in the same manner as SBC was spun off.

It is also possible that IBM could be directed to go out of the application software business, or the maintenance business, or to actually get rid of part of its computer business; for example, the peripheral as opposed to the central processors. As part of the 1956 consent decree, IBM had to get rid of a large part of its tab card manufacturing business. The Supreme Court has characterized divestiture as "the most drastic, but most effective remedy" and said that the Government would not be denied divestiture because "economic hardships, however severe, may result." While divestiture is a harsh remedy, the Justice Department likes to use it. Donald Turner has said: "The difficulties of formulating divestiture plans are usually soluble – we would of course desist where they are not. The disruptive effects of divestiture are, I believe, commonly exaggerated. In any event the short run consequences are greatly outweighed by prospective long-run gains."

The Government's case against IBM is a civil one and therefore asks no criminal penalty. However, as noted before, Control Data and DPF&G are asking for both actual and penal damages and for their attorney's fees. There will, of course, be considerable other expenses involved which could have an effect upon earnings, particularly in the smaller company. The lost executive time, the adverse publicity, and the possibility of stockholders' derivative actions for waste of corporate assets against the unsuccessful party. What is likely to happen? There are at least four possibilities: no change in the status quo; separate pricing for hardware, software and support; the independent subsidiary or SBC approach; and divorce by forcing a sale of part of the business. Because of the potentially disastrous effect of a final adverse decree in the Government's suit, and the multitude of actions which could arise therefrom, the odds seem to be against the Attorney General's case ever going to trial.

Some 80% of Government cases end up as consent decrees, undoubtedly in large part because then they cannot be used as evidence against the defendant. To get such a consent decree the defendant may have to give up more than he would if he tried the case. Edwin Zimmerman, who just retired as Assistant Attorney General in charge of the Antitrust Division, commented on this as follows:

> Problems of adequate relief vary greatly according to the nature of the violation, and its past and future impact on the market. Quite often, therefore, the civil relief we find necessary to prevent recurrence of the illegal practice must be supplemented by relief designed to remedy the past effects of the practice and to dispel the possibility of an automatic projection of those effects into the future. Hence, in particular cases, the Department may insist upon an injunction against engaging in practices which in and of themselves are not unlawful . . . or the relief requested may apply to a broader geographic area than that which was the focus of the particular complaint, or, similarly, to a broader line of products than the particular products in which the abuse occurred.

There will be considerable pulling, hauling and other kinds of negotiation before a consent decree would be entered and it may be several years. (There were four years between filing complaint and the entry of the consent decree in the last IBM case.) In the meantime, the structure of the computer industry could change substantially. It seems likely that separate pricing will come well before a decree in this case, that the leasing companies may have an entirely different relationship, and that the effect of other developments on the fringes of the computer industry may have considerable impact.

Perhaps the most important fringe area – actually, it might better be termed a collateral area – deals with communications. As many of you know in late 1967 the Federal Communications Commission started inquiry into the relationship between computers and communications. Communications, as we all know, is a very heavily regulated industry and in many cases monopolistic.

But the telephone companies can certainly have an impact on the computer industry particularly as the need for communications grows with the improvement of time sharing systems. Bernard Strassburg, Chief of the Common Carrier Bureau of the Federal Communcations Commission, has described AT&T's position as follows:

> Bell's prospect for growth into areas outside of communications is inhibited by the terms of the consent judgment entered in 1956 to resolve the antitrust suit brought by the Justice Department against AT&T and Western Electric. Spokesmen for the Bell System have consistently disavowed any intent to compete in the field of computer manufacture or data processing service. But it is only so long as these services remain unregulated that the consent judgment operates to prohibit Bell from competing in the sale of computer and data processing services.
>
> Nevertheless, Bell must be considered an important factor in any discussion of competition in the data processing industry because it is the principal source of the transmission facilities by which remote sharing of computers takes place. While Bell may not itself compete for data processing business, it does provide the communications facilities upon which this business depends to an ever-increasing extent. In large measure, it is Bell whose policies and programs determine when and what facilities will be available to meet the requirements of the computer industry. It is also Bell that in the first instance, but subject to regulatory review, decides how its facilities are to be used by the computer industry.

The position of the Johnson administration's Antitrust Division with respect to the interplay between antitrust and the communications industry was set forth last spring by then Antitrust Division Chief, Donald Turner, when he said:

> Given the fact that regulation at best can probably not supply as strong incentives to technological innovation as those created by competition, monopoly should be permitted only as to those functions where overwhelming economies of scale are in fact demonstrable, and where no alternative structure could achieve much the same gains . . .
>
> A monopolist should not be permitted to lever his way into competitive markets . . . The monopolist should be denied any assurance that his protected status is perpetual or irrevocable . . .
>
> The regulatory agency should redefine its central mission as that of extracting from the monopolist an approximation, at least, of the performance that we expect the forces of the market to produce in industries where effective competition is feasible.

Some of you may feel that since the Administration has changed we can expect a change in antitrust attitude. But in his testimony before the Senate Judiciary Committee at the time of his nomination, Richard MacLaren, the new Chief of the Antitrust Division, told the Committee that he endorsed the role the Antitrust Division had taken in regulatory agency matters in recent years and said that permitting competition in regulated industries is consistent with President Nixon's position of reducing regulation.

And last spring, when he was chairman of the American Bar Association's Antitrust section, Mr. MacLaren described Turner and Zimmerman as one of the best teams "in training, experience and temperament ever to head the Antitrust Division."

The attitude of the FCC and legislation affecting regulation of the computer industry, either increasing or decreasing it, could have considerable effect upon the position of IBM, the relative power of Telephone and Western Union, and the entire computer industry. This in turn might well have a decided effect on how a Consent Decree might be structured.

My own *very cloudy* crystal ball forecasts the establishment of another "independent" subsidiary or two: no domestic divestiture; and discontinuance of some of the marketing practices which the Attorney General claims are illegal. My guess on the private suits, both those filed already and others which may be filed, is for settlement, not trial, with agreements under which IBM will, directly or indirectly, pay most of the litigation costs, and will stop some of the practices which others claim are unfair.

E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 30,1969 ● VOL.4,NO.17 P.J.McGOVERN,EDITOR

IBM's annual meeting

## SMOOTH SAILING IN THE FACE OF UNCERTAIN WINDS

At this rather critical point in the history of the computer industry -- with important litigation pending in the courts and major policy and product announcements anticipated at any time -- IBM executives traveled to Santa Monica, Calif. to hold the company's annual meeting this week. And whether it is the result of the locale, the supreme confidence of the stockholders, or pure blind faith, the meeting was held in an unexpected atmosphere. In words of one syllable: "Smooth!"

The tone of the meeting was set shortly after it opened when a stockholder called for . . . and received . . . a standing ovation for the company and its management. About the only dissenting factor at the two-hour session was the presence of some 30 pickets outside -- critizing, of all things, the fact that an IBM subsidiary, Science Research Associates, publishes sex education material.

There was the normal business, of course: election of directors, approval of stock option plan modifications, and the like. Then Thomas J. Watson, Jr. (after being asked to identify himself) opened the floor for questions. Some were interesting; none seemed antagonistic or profound:

- IBM has been accumulating cash and therefore showed quite a bit of interest as "other income" in the latest quarterly statement. This situation, it was noted, is expected to change shortly.

- During the last five years IBM has been losing some middle management to software houses and smaller firms. Stock options and other incentives have been instituted to remedy this, and the attrition rate now is dropping.

- Although IBM is not, "at the moment," directly interested in facilities management, it currently does some turnkey business through its Federal Systems Division and expects to use this technique "increasingly" in other areas.

- The repeal of the 7% investment tax credit will have "negligible" effect on IBM -- about four cents per share.

- If, as a result of a court judgement, a split-up of IBM is called for, shares of any new companies created would be distributed to IBM stockholders.

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- The company expects to appeal the $480,000 in damages against the Service Bureau Corp awarded to F.B. Clements & Co., a Minnesota automobile wholesaler. Clements sued for fraud and misrepresentation, claiming it had lost business. IBM's chairman said that "IBM feels it is responsible for the flawless operation of its computers" but not for the way in which they are used.

- IBM last year shipped about $10 million worth of computers to Iron Curtain countries to help drive a wedge between Western Europe and Russia. The subsequent comment that "our country is always first, then the company" drew a large round of applause.

- A new plant, long scheduled for the general area, was located in Rochester, Minn. because this is the first U.S. soil touched by Mr. Watson when he returned from Siberia during World War II. While there he became acquainted with the owner of the local hotel and bank -- also named Watson -- and since has felt fond of the city.

And so it went. Perhaps this was simply the lull before the storm. More likely, however, the tone of the annual meeting was just reinforcing evidence that IBM stockholders realize they are part of a growing portion of the nation's economy . . . part of a company that, in whole or parts, will continue to do quite well.

## HONEYWELL AND AUERBACH FORM COMPUTER SERVICES COMPANY

The recent announcement that Honeywell, Inc. and Auerbach Corp. have joined forces to form an "independent service company" can really be counted as another step in the evolution of the computer industry. This new "autonomous and independent enterprise," the announcement said, will seek "a significant share" of the developing market for "dedicated" computer information services. In a word, the new Honeywell-Auerbach Computer Services is going into the Rair (Remote Access/ Immediate Response -- see EDP/IR Aug.9,1968) business.

The company plans to develop Automated Industry Management Services (AIMS) for selected industries . . . concentrating initially on a service for savings and loan associations. The group plans to "utilize Honeywell's financial and equipment resources and technical support, and Auerbach's financial resources and technical experience in information systems design and software development."

In a sense, the new firm will be competing with the time-sharing network recently announced by Honeywell (EDP/IR Feb.19,1969), but it could become one of this operation's biggest customers. Inherent in the plans announced by Honeywell-Auerbach is the possibility of wholesaling time from existing time-sharing operations. In essence, it will line up customers to use its specialized software, buy blocks of time, install terminals, and connect them to wherever it can buy time for the lowest rate.

Also, the company may prove a haven for the fledgling time-sharing operations that just can't make a go of it (see story, page 3). One of the characteristics of the new organization, as described in the announcement, is to "have a highly flexible organizational structure that will permit investment in, as well as internal development of, new dedicated service ideas or operations." Finally, the firm is illustrative of a growing trend. It is in the position to grant stock options to key employees, eventually take part of its shares public, and thereby retain valuable employees who might otherwise want to start their own business.



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## ADAPSO STUDY SHOWS OPERATING RATIOS FOR COMPUTER SERVICES COMPANIES

The Association of Data Processing Service Organizations (ADAPSO) has just completed a study which compares the operating ratios for three different types of computer service companies -- service bureaus, software firms, and time-sharing operations. Typical balance sheets for each of these types of companies are shown in the table below.

The data for a typical data processing firm (service bureau) is based on a relatively large sample (75 replies). Those for the other two types are based on much smaller samples. The report points out that the data for software firms is probably typical because the responses were quite consistent. Financial data reported by time-sharing companies, however, was "quite diverse," and therefore the data is probably not as meaningful. But the data does "give some indication of the characteristics." All figures are based on 1967, a very formative period for time-sharing companies. EDP/IR has done other examinations of time sharing, however, and considers the figures indicative of one-computer operations.

| | Data-Processing | | Software | | Time-Sharing | |
|---|---|---|---|---|---|---|
| Income Statement | (*all entries are in thousands of dollars) | | | | | |
| Gross Annual Revenue | $450* | 100% | $1,600* | 100% | $500* | 100% |
| Operating Expense | 340 | 76 | 1,200 | 75 | 600 | 120 |
| | 110 | 24 | 400 | 25 | -100 | -20 |
| Other Expense | 72 | 16 | 275 | 17 | 175 | 35 |
| Profit Before Tax | 38 | 8 | 125 | 8 | -275 | -55 |
| Tax | 14 | 3 | 50 | 3 | -- | -- |
| Profit After Tax | 24 | 5 | 75 | 5 | -275 | -55 |
| Balance Sheet | | | | | | |
| Current Assets | 105 | 53 | 725 | 85 | 300 | 50 |
| Fixed Assets | 80 | 40 | 75 | 9 | 250 | 42 |
| Other Assets | 15 | 7 | 50 | 6 | 50 | 8 |
| TOTAL ASSETS | 200 | 100 | 850 | 100 | 600 | 100 |
| Current Liabilities | 60 | 30 | 350 | 41 | 200 | 33 |
| Long-Term Debt | 45 | 23 | 50 | 6 | 275 | 46 |
| Equity | 95 | 47 | 450 | 53 | 125 | 21 |
| TOTAL LIABILITIES | 200 | 100 | 850 | 100 | 600 | 100 |
| Sources of Revenue | | | | | | |
| Data Processing | 350 | 78 | 120 | 7 | 200 | 40 |
| Program & Systems | 60 | 13 | 1,400 | 88 | 175 | 35 |
| Other | 40 | 9 | 80 | 5 | 125 | 25 |
| Type of Business | | | | | | |
| Repetitive | 350 | 78 | 600 | 38 | 250 | 50 |
| Non-repetitive | 100 | 22 | 1,000 | 62 | 250 | 50 |



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## STUDY SHOWS RAPIDLY GROWING DEMAND FOR DATA COMMUNICATIONS TERMINALS, WITH CATHODE RAY TUBE DEVICES ON CUSTOMERS' "MOST WANTED" LIST

New data communications terminals are being announced with great regularity these days, and a large number of new units will be displayed publicly for the first time at the Spring Joint Computer conference, which opens in Boston on May 14. And there is a very logical reason for manufacturers to be introducing new equipment for this marketplace: Terminals constitute the fastest growing segment of the computer hardware industry (EDP/IR Mar.25,1969).

This fact is well illustrated in the summary of a comprehensive survey of data communications terminal equipment users, conducted by the International Data Corporation, publisher of EDP/IR. In this survey, IDC received completed questionnaires from over 2500 users, non-users, and potential users of DCT equipment. The growing importance of this type of computer usage is illustrated by the small percentage (29%) of the respondees who reported no use of or plans to install terminal equipment. Also, those using terminals indicated increased future activity in on-line communication operations, as can be seen in the table below:

DAILY USE OF DATA COMMUNICATIONS TERMINALS BY REPORTING INSTALLATIONS

| Hours On-Line | 1968 | 1969 |
|---|---|---|
| None | 333 | 154 |
| 1-4 Hours | 196 | 237 |
| 5-8 Hours | 202 | 394 |
| 9-12 Hours | 153 | 222 |
| 13-16 Hours | 52 | 96 |
| 17-20 Hours | 31 | 53 |
| 21-24 Hours | 107 | 214 |

The survey actually located over 60,000 terminals in 1968. These users indicated plans to have 110,000 terminals by the end of 1969 and 200,000 by 1972. Based on this, IDC has projected that there will be about 170,000 data communications terminals installed at some 40,000 remote sites by the end of this year, and that over 400,000 terminals will be communicating on-line with computers in the U.S. by 1972.

And, as time passes, the average user expects to spend more money for terminals. When the survey was done in late 1968, it was found that 30% of data communications users are spending less than $1,000 per month for terminal equipment, yet the number of respondees who expected to be in this category in 1970 was less than 14%. Moreover, while approximately 6% are now spending over $10,000 per month on terminals, within two years more than 20% project expenses at this level.

### Computers used with terminals

As could be expected, IBM is far and away the leading supplier of computers connected to terminals. Presently, IBM computers are involved in about 67% of on-line operations and, by the end of 1969, this percentage is expected to increase to approximately 73%. The five most popular computers in data communications, in order, are the 360/30, 360/40, 360/50, 360/65, and 360/20. By the end of this year, only the 30 and 40 will change positions. Competitive models which ranked high on the user list are the RCA Spectra 70/45, the NCR 315, the Honeywell H-200, the Burroughs 5500, the GE 400 series computers, and the Univac 1108.



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## Expected use of terminals

Over 300 different terminal models were reported being used by the respondees. The most popular single terminal, at present, is the IBM 1050 (a typewriter-like system); if all different models of Teletype terminals are lumped together, however, the teleprinter certainly takes first place with over 10,000 reported in the survey. Most popular models are the ASR 33 and ASR 35.

Looking ahead, the type of terminal "most wanted" by users is the cathode ray tube (CRT) type, with current users expecting a seven-fold increase during the next three to four years. Of these, the one most named by users is the IBM 2260, with almost 15,000 expected to be in use in 1972 (an increase of better than 400% during four years). Indeed, users want CRTs for both scientific and commercial applications. The following table shows three of the most popular application areas being considered for future implementation, and the terminals the users say would be most desired:

ANTICIPATED FUTURE APPLICATIONS AND TYPE OF TERMINAL DESIRED

| Future application | 1st Choice | 2nd Choice | 3rd Choice |
|---|---|---|---|
| Inventory Control | IBM 1050 | CRT Device | IBM 2260 |
| Inquiry | CRT Device | IBM 2260 | IBM 1050 |
| Order Processing | CRT Device | IBM 1050 | IBM 2260 |

In the survey, over 700 different applications -- both on-line and off-line -- were reported for data communications terminal equipment. The most common applications for each mode are shown below; as might be expected, the rankings and even the applications differ sharply:

MOST POPULAR APPLICATIONS OF TERMINALS USED ON-LINE AND OFF-LINE

| On-Line Rank | Application Area | Off-Line Rank | Application Area |
|---|---|---|---|
| 1 | Inquiry | 1 | Order Processing |
| 2 | Inventory Control | 2 | Payroll |
| 3 | Savings | 3 | Inventory Control |
| 4 | Production Control | 4 | Production Control |
| 5 | Research (Scientific) | 5 | Accounting |

## How terminals are selected and what users want

One goal of the survey was to determine the criteria that is used in terminal equipment selection. Although cost was certainly listed as an important consideration, the factor selected as most important -- by more than three times as many people than those who chose cost -- was "performance/reliability." Service and vendor reputation were also considered important, and many users also mentioned systems compatibility, software support, and availability.

In general, users think terminals cost too much, but the most serious limitation noted was the slow printing capability of remote terminals that rent for less than $500 per month. What users really want is a display terminal, with limited hard copy capability for capturing selected portions of output, and a pricetag that reads less than $300 per month rental.



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## NEW REGISTRATIONS BY COMPUTER COMPANIES

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| ATLANTIC TECHNOLOGY CORP. | Atlantic Technology Corp., 7th St. and New Hampshire Ave., Somers Point, N.J., which designs and develops CRT devices, on April 1, filed 250,000 common. The proceeds, at a price to be set by amendment (max.$15 per share), will be used for construction, debt repayment and working capital. The underwriter will be F.S. Smithies & Co., 45 Wall St., New York. |
| BETA INSTRUMENT CORP. | Beta Instrument Corp., 377 Eliot St., Newton Upper Falls, Mass., which designs and manufactures CRT displays, on March 28, filed 240,000 common. The proceeds, at a price of $5 per share, will be used for product development, marketing and debt retirement. No underwriting is involved. |
| BRADFORD COMPUTER & SYSTEMS, INC. | Bradford Computer & Systems, Inc., 1700 Broadway, New York, which provides technical services related to the design and development of computer and clerical systems, on March 28, filed 225,000 common. The proceeds, at a price to be set by amendment (max. $12 per share) will be used for general corporate purposes. The underwriter will be Kidder, Peabody & Co., Inc., 20 Exchange Place, N.Y. |
| BUSINESS INFORMATION TECHNOLOGY, INC. | Business Information Technology, Inc., 5 Stratmore Rd., Natick, Mass., which manufactures and sells small, high speed, general purpose digital computers, on March 27, filed 125,000 common. The proceeds, at a price of $12 per share, will be used for R&D, marketing and equipment. No underwriting is involved. |
| COMPUTER IMAGE CORP. | Computer Image Corp., 2162 S. Jason St., Denver, Colo., which is developing a display system using both digital and analog devices, on March 20, filed 200,000 common. The proceeds, at a price to be set by amendment (Max. 12.50 per share), will be used for R&D, equipment and debt repayment. The underwriter will be Boettcher & Co., 828 17th St., Denver, Colo. |
| COMPUTER NETWORK SCIENCES CORP. | Computer Network Sciences Corp., 1080 Eddie Allen Road, Melbourne, Florida, which intends to design, manufacture, and market a general purpose digital computer, on March 6 filed 255,000 common. The proceeds, at a price of $7.50 per share, will be used for developing, manufacturing, and marketing the computer. The underwriter will be Winston, Perry & Meyers, Inc., 140 Broadway, New York. |
| COMPUTER PRODUCTS, INC. | Computer Products, Inc., 2801 E. Oakland Park Blve., Fort Lauderdale, Fla., which manufacturers interface devices for process control and real-time test systems applications, on March 28 filed 150,000 common. The proceeds, at a price of $6 per share, will be used for equipment and working capital. No underwriting is involved. |



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| | |
|---|---|
| E.L.I. COMPUTER SYSTEMS, INC. | E.L.I. Computer Systems, Inc., 2 Pennsylvania Plaza, New York which provides a variety of services to prospective EDP equipment users, on March 28, filed 160,000 common. The proceeds, at a price to be set by amendment (Max. $10 per share), will be used for expansion, marketing and administrative expenses. The underwriter will be Weis, Voisin Cannon, Inc., 111 Broadway, N.Y. |
| INTERDATA, INC. | Interdata, Inc., 2 Crescent Place, Oceanport, N.J., which designs, manufactures and sells small digital computers and data communication systems, on March 28, filed 300,000 common. The proceeds, at a price to be set by amendment (Max. $12.50 per share), will be used for equipment, inventories and debt repayment. The underwriter will be Gregory & Sons, 40 Wall St., N.Y. |
| PENTA COMPUTER ASSOCIATES, INC. | Penta Computer Associates, Inc., 445 Park Ave., New York, which provides consulting, systems analysis and programming services to EDP users, on April 1, filed 150,000 common. The proceeds, at a price to be set by amendment (Max. $10 per share), will be used for debt repayment and working capital. The underwriter will be Kordich, Victor & Neufeld. |
| SIMULATORS, INC. | Simulators, Inc., 3611 Commercial Ave., Northbrook, Ill., which develops and sells analog computers and related components, on April 1, filed 200,000 Class A common. The proceeds, at a price to be set by amendment (Max. $10 per share), will be used for marketing and equipment. The underwriter will be Sterman & Gowell, Inc., 120 Water St., N.Y. |
| STANDARD COMPUTER CORP. | Standard Computer Corp., 633 East Young St., Santa Ana, Calif., a computer manufacturer, on April 1, filed 240,000 common and $3,000,000 of sub. debentures, to be sold in units of a $1000 debenture and 80 shares. The proceeds, at a price to be set by amendment (Max. $2200 per unit), will be used for debt retirement and for working capital. The underwriter will be L.M. Rosenthal & Co., Inc. |
| SYCOR, INC. | Sycor, Inc., 117 North First St., Ann Arbor, Mich., which manufactures low-cost programmable terminal systems, on March 28, filed 250,000 common. The proceeds, at a price to be set by amendment, will be used for product development, equipment and land. The underwriter will be Burnham and Co., 60 Broadway, N.Y. |
| SYSTEMS FOR ADVANCED INFORMATION, INC. | Systems for Advanced Information, Inc., 245 Waterman St., Providence, R.I., which offers several computer services, on March 21, filed 150,000 common. The proceeds, at a price to be set by amendment (Max. $5.50 per share), will be used for program development and expansion. The underwriter will be P.K. Hickey & Co., 80 Broad St., New York. |
| TIME-SHARING TERMINALS, INC. | Time-Sharing Terminals, Inc., 7979 Georgetown Road, Bethesda, Md., which sells and leases terminals and related support and software, on March 21, filed 350,000 common. The proceeds, at a price of $10 per share, will be used to purchase terminals and for working capital. The underwriter will be Kluger, Ellis & Mann, 26 Broadway, New York. |



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| | 1969 High | 1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 76 7/8 | 65 1/4 | 872 | 74 1/4 | 74 1/8 | 73 1/2 | - 1 | - 1.34 |
| American R & D | 182 1/2 | 154 1/2 | 197 | 173 3/4 | 164 3/4 | 165 5/8 | - 6 5/8 | - 3.84 |
| Ampex Corp. | 39 3/4 | 32 1/2 | 1689 | 39 1/8 | 37 | 38 | + 1/4 | + 0.66 |
| Bunker Ramo | 17 5/8 | 12 5/8 | 1706 | 13 3/4 | 12 5/8 | 12 7/8 | -- | -- |
| Burroughs | 259 1/8 | 220 3/8 | 802 | 259 1/8 | 246 1/8 | 246 3/4 | - 4 | - 1.59 |
| Collins Radio | 69 3/4 | 48 | 2117 | 68 | 59 5/8 | 62 | + 2 1/4 | + 3.77 |
| Computer Sciences | 65 1/2 | 49 | 750 | 63 5/8 | 59 1/4 | 62 3/4 | + 2 1/2 | + 4.15 |
| Control Data | 152 3/4 | 125 1/8 | 2391 | 139 | 132 1/8 | 138 | + 3/8 | + 0.27 |
| Electronic Assoc. | 25 1/4 | 18 1/2 | 450 | 20 3/4 | 18 1/2 | 18 3/4 | - 1 3/8 | - 6.83 |
| General Electric | 96 1/4 | 85 1/8 | 2400 | 92 | 88 3/4 | 91 | + 5/8 | + 0.69 |
| Honeywell | 130 5/8 | 107 3/4 | 942 | 130 5/8 | 122 1/2 | 130 | + 5 3/4 | + 4.63 |
| IBM | 316 | 291 3/4 | 1449 | 314 1/2 | 305 1/4 | 308 1/4 | + 2 1/2 | + 0.80 |
| ITT | 58 1/2 | 48 1/8 | 2522 | 53 | 50 | 52 | + 3/4 | + 1.46 |
| Litton | 74 1/2 | 48 1/4 | 3322 | 52 1/2 | 48 1/4 | 52 3/8 | + 2 3/8 | + 4.75 |
| Memorex | 82 5/8 | 65 | 805 | 80 | 74 | 79 | + 3 3/8 | + 4.46 |
| National Cash Register | 129 3/4 | 108 | 1366 | 128 7/8 | 120 1/4 | 124 | + 2 | + 1.64 |
| RCA | 48 1/8 | 41 1/4 | 2678 | 44 1/8 | 43 | 43 7/8 | + 1/8 | + 0.29 |
| Raytheon | 50 1/4 | 38 | 2896 | 40 5/8 | 39 | 39 3/8 | - 1/2 | - 1.25 |
| Sanders | 61 7/8 | 40 | 724 | 46 5/8 | 43 1/8 | 43 1/8 | - 2 1/4 | - 4.95 |
| Scientific Data | 119 3/4 | 83 | 1579 | 115 3/4 | 111 5/8 | 112 3/4 | + 1/8 | + 0.11 |
| SCM | 47 1/8 | 38 | 1542 | 42 3/4 | 38 3/4 | 41 | + 1 | + 2.50 |
| Singer | 84 1/4 | 71 3/4 | 870 | 79 | 75 | 75 3/8 | - 1 3/8 | - 1.79 |
| Sperry Rand | 54 | 44 1/4 | 3225 | 52 7/8 | 48 7/8 | 49 7/8 | - 1 1/8 | - 2.21 |
| Teledyne | 45 1/2 | 38 3/4 | 2883 | 43 7/8 | 38 3/4 | 39 | - 3 1/8 | - 7.41 |
| Xerox | 272 1/8 | 241 | 1315 | 251 | 241 | 242 | - 9 3/4 | - 3.87 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 0.29 | - 0.20 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 77 1/4 | 63 1/4 | 184 | 73 1/2 | 70 | 72 1/2 | + 3/4 | + 1.05 |
| Calcomp | 37 1/2 | 30 1/8 | 323 | 33 1/8 | 30 1/8 | 30 1/4 | - 2 1/2 | - 7.63 |
| Clary Corp. | 25 3/4 | 18 3/4 | 428 | 21 3/8 | 18 3/4 | 20 1/4 | + 1/2 | + 2.53 |
| Computer Applications | 21 7/8 | 15 1/8 | 152 | 16 3/4 | 15 1/8 | 15 3/8 | - 1 1/8 | - 6.82 |
| Computing and Software | 50 1/2 | 37 | 501 | 47 | 43 3/4 | 47 | - 1/2 | - 1.05 |
| Data Proc. Fin. & Gen. | 60 1/4 | 43 1/4 | 680 | 48 1/4 | 43 1/8 | 43 1/4 | - 5 7/8 | -11.95 |
| Data Products | 27 7/8 | 16 1/2 | 948 | 18 3/4 | 16 1/2 | 17 7/8 | - 1/2 | - 2.72 |
| Digital Equipment | 175 1/4 | 138 1/2 | 136 | 159 3/4 | 155 | 155 | - 5 | - 3.13 |
| Elect. Comp. Prog. In. | 38 1/4 | 27 | 405 | 32 3/4 | 28 1/4 | 29 7/8 | + 1 5/8 | + 5.75 |
| Granite Computer | 45 1/2 | 28 3/8 | 267 | 34 | 28 3/8 | 29 1/4 | - 4 1/2 | -13.33 |
| Greyhound Computer | 28 5/8 | 19 5/8 | 311 | 21 1/2 | 19 5/8 | 20 3/8 | - 1 1/4 | - 5.78 |
| Leasco | 54 | 36 | 3169 | 43 7/8 | 40 5/8 | 41 7/8 | - 1/8 | - 0.30 |
| Levin-Townsend Comp. | 57 1/2 | 34 3/4 | 4465 | 47 3/8 | 34 3/4 | 42 1/4 | - 4 3/4 | -12.67 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 340 | 25 1/4 | 21 1/2 | 24 7/8 | - 2 1/2 | -11.17 |
| Mohawk Data Sciences | 79 | 59 3/4 | 2583 | 75 5/8 | 66 1/4 | 71 1/4 | - 3 | - 4.04 |
| Planning Research | 32 | 23 7/8 | 825 | 32 | 27 3/4 | 29 1/4 | - 1 1/4 | - 4.10 |
| Potter Instrument | 35 3/4 | 27 1/8 | 465 | 32 | 29 | 31 1/8 | - 7/8 | - 2.89 |
| Randolph Computers | 43 7/8 | 29 1/8 | 621 | 31 1/2 | 29 1/8 | 29 3/8 | - 2 1/4 | - 7.11 |
| Sys. Eng. Labs. | 33 1/4 | 26 1/8 | 843 | 33 1/4 | 28 1/2 | 33 | + 3 | +10.00 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 1.59 | - 3.96 |

| | 1969 High Bid | 1969 Low Bid | April 18, Bid | April 18, Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 1/2 | 31 | 34 | 36 | 35 | - 1 | - 2.85 |
| Aries Corp. | 19 | 8 1/2 | 9 3/4 | 10 3/4 | 10 | - 1/4 | - 0.25 |
| Bolt, Beranek & Newman, Inc. | 19 | 14 1/2 | 16 | 17 | 16 1/2 | - 1/2 | - 3.03 |
| Computer Usage | 40 | 28 1/2 | 28 1/2 | 30 | 33 | - 4 1/2 | -13.63 |
| Cyber-tronics | 12 1/2 | 9 1/8 | 9 7/8 | 10 3/8 | 11 3/4 | - 1 7/8 | -15.95 |
| Digitronics | 22 1/2 | 15 | 16 | 17 | 17 | - 1 | - 5.88 |
| DPA, Inc. | 16 1/4 | 10 3/8 | 10 7/8 | 11 1/4 | 12 | - 1 1/8 | - 9.38 |
| Electronic Memories | 62 | 46 | 55 1/2 | 56 1/2 | 55 1/2 | -- | -- |
| Fabri-Tek | 12 7/8 | 10 1/2 | 10 3/4 | 11 1/4 | 11 7/8 | - 1 1/8 | - 9.47 |
| Informatics, Inc. | 36 | 27 | 21 | ** | 22 | - 1 | - 4.55 |
| LMC Data, Inc. | 8 1/4 | 5 1/4 | 5 1/4 | 6 | 5 1/2 | - 1/4 | - 4.55 |
| Management Assistance | 14 7/8 | 8 5/8 | 8 7/8 | 9 1/4 | 10 | - 1 1/8 | -11.25 |
| Optical Scanning Corp. | 118 | 54 | 65 | 69 | 55 | +10 | +18.18 |
| Recognition Equipment, Inc. | 76 | 54 | 64 | 65 | 67 1/2 | - 3 1/2 | - 5.19 |
| Tally Corp. | 36 | 22 | 27 1/2 | 29 | 25 1/2 | + 2 | + 7.84 |
| TBS Computer Centers Corp. | 21 1/2 | 11 | 21 1/2 | 23 1/2 | 17 | + 4 1/2 | +26.47 |
| University Computing | 155 | 89 | 93 | 96 | 97 | - 4 | - 4.12 |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 16,1969 ● VOL.4,NO.18 P.J.McGOVERN,EDITOR

Confusion reined supreme

## SPRING JOINT COMPUTER CONFERENCE WAS THE BIGGEST EVER: NOTHING WAS SHOCKINGLY NEW, BUT KEY-CAPTURE UNITS HIGHLIGHTED THE SHOW

It's very refreshing when newspapermen, who must cover a wide variety of subjects, capture the real essence of a story that more technically oriented journalists find a challenge to grasp. This was the case at Spring Joint, in Boston. We feel no reason to attempt a better description:

*A 21st century carnival. A light show. Public relations run amok. A taste of the breakdown that may face an overpopulated world.*

*The Spring Joint Computer Conference in War Memorial Auditoriam is all those things.*

*The Auditorium is a midway. The barkers are female, miniskirted, with cleavage. They schill for $100 million worth of the latest in computer and related equipment that cost its manufacturers hundreds of thousands of dollars to display.*

*There are colored lights, gas-filled ballons on strings, and buttons that declare their wearers to be "compatible" and more. There are hot dogs and hamburgers and a hospitality suite around every corner.*

*It is the show that brings out 5000 representatives of the industry and 15,000 "others" -- buyers, scientists, engineers, radicals, students, rubbernecks. Often it seems as though everybody is a public relations representative . . .*

*Come up to breakfast, to brunch, to lunch, for cocktails, to dinner. Be our guest at Pops at the Playboy Club, come up to the room and have a belt and let's talk about our new analog to digital time-sharing compatible disk pack readout that is the fastest, biggest, cheapest, easiest to operate little 'ol thing you ever saw.*

*Not a chair anywhere in the Auditorium where it is wall to wall people. Weary, glassy-eyed conferees roam the corridors of the Sheraton looking for an empty sofa. But they are all taken by slack-jawed sleepers who have had it.*

*Try for an elevator, and wait . . . wait . . . wait. Shout for a taxi, and shout in vain. Not a cab within four blocks of the Prudential Center and the traffic is congealed, anyway. Every restaurant from the waterfront to Framingham has hungry customers stacked up. Not a hotel room to be had for 55 miles.*

-- Donald White, Boston Globe

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Anticipated but apparent

Amid this hectic atmosphere . . . at the booths from which manufacturers touted every conceivable computer-type of product . . . there were at least 10 companies demonstrating or announcing their "key-capture" unit. And many of these new units could be classified as "third generation," pointing out the path that new computer input devices are likely to follow.

It is rather interesting to note that some of the early thinking about this approach to input started several years ago when the Internal Revenue Service -- even as it was still working to get all of its operations onto computers (EDP/IR Feb.23,1967) -- started exploring ways to eliminate the punched-card portion of computer input.

As this was going on, many companies -- inspired with the success of Mohawk Data Systems and excited by an apparent need -- started developing all sorts of variations on the key-capture idea . . . the idea of transferring information directly from a keyboard to computer-processible form. It is seemingly significant, therefore, that the IRS has recently announced its acceptance of a large key-capture system -- called Direct Data Entry and supplied by General Electric -- at a time when similar devices of a more commercial nature are the hottest items of equipment on the floor of the show.

The key-capture equipment announced during the last few months brings the latest technological ideas to what has been the least dramatic but most needy area of data processing -- the preparation of input data. In so doing, the companies introducing this equipment threaten to impact the use of punched cards. These companies, of course, have no vested interest in the manufacture of punched cards. On the other hand, IBM seems finally to be starting the current in this direction: Its expected small new "3.7" terminal computer (EDP/IR Apr.4, 1969) is supposed to have a radical credit-card-sized input card. This could be a major move to convince data processing users to think "non-Hollerith."

GE's system for IRS

Moving a computer system away from punched cards is not so easy as it might seem at first thought, and movements in this direction will be slower than anticipated by the manufacturers of the new equipment. There are about 400,000 keypunch units in this country [according to estimates made by the International Data Corporation, publisher of EDP/IR], and about half of these could ultimately be converted to a key-capture system. Already, however, almost 20,000 key-to-tape units have been installed, and the market is large but limited.

GE, for example, has been working with IRS for well over two years to develop the system that finally has been approved. At present, the IRS has a GE system which allows operators to use display terminals connected to a pair of GE-Pac computers. As a result, all data goes directly to magnetic tape, and 400 million punched cards -- "enough to wrap the earth in a 'cummerbund' two layers thick" -- are eliminated. The center in Austin, Texas previously used 510 keypunch and verifier machines. Some have been retained for various purposes, but the big group used for production have been replaced by 352 of the GE terminals. With these, the IRS can use operators with only a modest typing proficiency. Only one third of the operators at the Texas center have ever had keypunch training. Prospective operators receive 40 hours of instruction before they are assigned to productive work.



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This shiftover approval by the IRS well illustrates the rapid progression within the computer industry. In the key-capture area, products have actually progressed through two generations in a very few years.

Market development and outlook

Until 1965, the only economical method of computer input -- with a very few exceptions -- was the punched card. That year, Mohawk Data Sciences announced its line of Keyed Data Recorders and the move away from punched cards began. The innovation in the Data Recorder was the use of the keystroke to create an electronic image directly on magnetic tape instead of triggering an arm to punch holes in a card. The tape was sequential, listing information simply in the order it was entered; but it could be read into a computer at tape-transfer speeds.

Mohawk's Data Recorder remained the only alternative to punched cards until early in 1968, when the floodgates opened. Honeywell announced its Keytape, Communitype its 100SR, Sangamo its Data Station. And IBM gave the idea its blessing by introducing its Model 50 magnetic data inscriber (EDP/IR Apr.25,1968). After that, new models have appeared with great regularity.

These keyboard-to-tape devices cost more per unit than conventional keypunches, but they offset labor costs through increased productivity. Honeywell has claimed, for instance, that three of its Keytapes can replace four keypunches and therefore that the actual costs -- machine rental plus operator salary -- are less. Additional labor savings are attributed to increased operator efficiency and lower turnover because key-to-tape devices operate more quietly than keypunches . . . and anyone who has spent much time around a busy keypunch can testify to its unpleasantness. Also, computer time can be saved when tape is the input medium.

This year, further sophistication has been added to this data preparation technique. The latest approach is called key-to-disk, but in reality it is a computer-controlled co-ordination of the key-to-tape operation. Instead of registering each keystroke directly onto magnetic tape, some of the latest systems record data on a disk, from which tapes are later prepared. This drastically reduces the amount of tape handling involved in the input preparation process and eliminates the need for tape "pooling" to prepare the actual input tape from several work tapes. Such a system has been termed a "third generation" key-capture operation.

The key consideration in all this, of course, is the cost of data input, and key-capture units do not offer substantial savings to all keypunch users. The small user may still want the flexibility of the keypunch and the fairly easy physical access to individual records when they are on cards. As the size of an installation increases, however, the economies of key-to-tape devices become more apparent. Until just recently, only very large computer installations -- those with 50 or so keypunches -- could realize the economies of the key-to-disk approach. Now, smaller systems are coming onto the market and they can provide substantial economies. For very small users, of course, the keypunch remains the least expensive input method.

Types of key-capture units

Of the multitude of different key-capture models on the market, there really are only three distinct categories. All of them are designed to provide the user with input data on magnetic tape and a few -- reflecting the trend toward disk-oriented computer systems -- put input data directly on a disk pack:



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- The simplest devices prepare the magnetic tape directly as keystroking produces a computer-readable character on the tape. All of the earlier devices fall in this category. Keyboard-to-tape devices of this type can include displays which allow operators to see what they are typing, and pooling units which merge the worktapes of many operators onto a single large tape for the actual input. With such a feature, several operators can work on the same job simultaneously and produce the final input data as a single tape.

- Another approach -- the only one taken by IBM to date -- is keyboard-to-cassette. This is similar to the key-to-tape, but there is an intermediate step between the keystroke and the actual computer tape. In this type a system, the operator keys information onto tape cassettes much like those used in stereo systems, and these are later collected and merged into computer-readable format. This separate operation adds to expense, naturally; on the other hand, many cassett systems utilize the tape pack for format control, through which the operator is presented a format display into which he types the record data.

- Key-to-disk systems provide all the advantages of cassette operations -- minimum tape handling and variable format control -- and they allow much more formatting flexibility. Data can be retrieved from disk more quickly than from other input media, so verification and correction of data is faster, and formats can be summoned more rapidly. In addition, the associated computer or computer logic can monitor the work of the operators and keep production records of performance.

Key-capture economics

Key-to-disk systems have centralized computer control, and obviously cost less per keyboard than key-to-tape units with similar features. But the price of the co-ordinating computer often has kept the cost of the whole operation for key-to-kisk higher until a high system loading level was reached. The earliest models of key-to-disk systems had capacities of 30 to 60 keyboards, so the market was limited to installations where there were very large input preparation groups.

The first breakthrough in this area has come from Inforex, Inc., which supplies at the lower side of the price structure what GE is providing the IRS. Inforex's "Intelligent Key Entry System" has only eight keyboards per control unit, and is supposed to be competitive with key-to-tape when five or more keyboards are connected to the controller. When nine or ten keyboards are required, the price/performance drops off again, but all-in-all the system looks to be competitive with keypunches.

It is difficult to say, at this point in time, just how large the eventual market for key-capture devices will be. Pure on-line devices may obsolete this method in a few years. The upper limit of the market, as we have pointed out, is the existing base of keypunch units . . . most of which were manufactured by IBM. Indeed, these utilitarian devices have given IBM a healthy bit of income for many years, and it is unlikely that the industry giant will easily relinquish this base. On the other hand, the bulk of key-capture units now in operation were made by companies other than IBM, and there doesn't seem to be a strong IBM entry on the horizon. Ironically, the key-capture submarket -- which should add up to about $200 million this year -- may end up being healthily shared by companies other than IBM . . . the company that really got its start with punched cards and related equipment.



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## NEW REGISTRATIONS BY COMPUTER COMPANIES

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| COMPERIPHERALS INC. | Comperipherals, Inc., 437 Madison Ave., New York, which is engaged in the manufacture and continuing development of electronic source data collection equipment known as the CPI 3100 System, on April 30 filed 175,000 common. The proceeds, at a price to be set by amendment (max.$13 per share), will be used to acquire the distribution rights of products produced by Roneo Vickers, Ltd., of Croydon, England. The underwriter will be Andersen & Co., 140 Broadway, New York. |
| COMPUTER RESPONSE CORP. | Computer Response Corp., 1100 17th St., N.W., Washington, D.C., which offers time sharing systems management, and computer consulting services, on April 17 filed 300,000 Class A common. The proceeds, at a price to be set by amendment (max. $7 per share), will be used to establish additional computer facilities and sales offices. The underwriter will be Auchincloss, Parker & Redpath, 2 Broadway, New York. |
| COMPRESS, INC. | Compress, Inc., 2120 Bladensburg Road, N.E., Washington, D.C., a software firm, on April 18 filed 1,000,000 common. The proceeds, at a price to be set by amendment (max. $15 per share), will be used for investments in computer related activities. The underwriter will be G.H. Walker & Co., Inc., 45 Wall St., New York. |
| DATA DIMENSIONS, INC. | Data Dimensions, Inc., 1200 Summer St., Stamford, Conn., which proposes to offer various data processing services, on April 18 filed 264,000 common. The proceeds, at a price to be set by amendment (max. $12 per share), will be used to acquire computer equipment, for marketing, and for software development. The underwriter will be Robinson & Co., Inc., 42 S. 15th St., Philadelphia, Pa. |
| DATA POWER, INC. | Data Power, Inc., 711 Third Ave., New York, which proposes to operate data processing service bureaus through information processing centers linked to a central computer through telephone lines, on April 28 filed 140,000 common. The proceeds, at a price of $6 per share, will be used for equipment, software development, computer time rental and for marketing. The underwriter will be Jed L. Hamburg & Co., Inc., 11 Broadway, Room 1014, New York. |
| DIGITAL SCIENTIFIC CORPORATION | Digital Scientific Corporation, 11661 Sorrento Valley Road, San Diego, Calif., which designs, manufactures and markets digital computing systems, on April 18 filed 185,000 common. The proceeds, at a price of $7.50 per share, will be used for product development, marketing and working capital. The underwriter will be John G. Kinnard & Co., Inc., 740 Northstar Center, Minneapolis, Minn. |



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF MARCH 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 18 | 2 | 20 | X |
| | 220 | $ 14,000 | 10/58 | 25 | 4 | 29 | X |
| | B100 | $ 2,800 | 8/64 | 98 | 17 | 115 | X |
| | B200 Series | $ 5,500 | 11/61 | 440 | 80 | 520 | X |
| | B300 Series | $ 9,500 | 7/65 | 460 | 100 | 560 | 50 |
| | B500 | $ 3,800 | 11/68 | 18 | 2 | 20 | 75 |
| | B2500 | $ 5,000 | 2/67 | 92 | 20 | 112 | 100 |
| | B3500 | $ 14,000 | 5/67 | 112 | 28 | 140 | 195 |
| | B5500 | $ 26,000 | 3/63 | 91 | 9 | 100 | 20 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 62 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 15 |
| | B8500 | $200,000 | 4/69 | 0 | 0 | 0 | 5 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 255 | 10 | 265 | X |
| | G-20 | $ 15,500 | 4/61 | 16 | 2 | 18 | X |
| | LGP-21 | $ 725 | 12/62 | 135 | 3 | 138 | X |
| | LGP-30 | $ 1,300 | 9/56 | 97 | 5 | 102 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 46 | 4 | 50 | X |
| | 160*/160A/160G | $2,100/$5,000/$12,000 | 5/60;7/61;3/64 | 453 | 37 | 490 | X |
| | 924/924A | $ 11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 45 | 3 | 48 | X |
| | 1700 | $ 3,800 | 5/66 | 141 | 61 | 202 | 85 |
| | 3100/3150 | $ 10,500 | 12/64 | 107 | 23 | 130 | 18 |
| | 3200 | $ 14,000 | 5/64 | 43 | 15 | 58 | X |
| | 3300 | $ 28,000 | 9/65 | 115 | 30 | 145 | 18 |
| | 3400 | $ 19,000 | 11/64 | 14 | 4 | 18 | X |
| | 3500 | $ 25,000 | 1/69 | 3 | 0 | 3 | 22 |
| | 3600 | $ 52,000 | 6/63 | 30 | 11 | 41 | X |
| | 3800 | $ 53,000 | 2/66 | 17 | 3 | 20 | X |
| | 6400/6500 | $ 58,000 | 5/66 | 53 | 19 | 72 | 25 |
| | 6600 | $115,000 | 8/64 | 48 | 14 | 62 | 18 |
| | 7600 | $240,000 | 1/69 | 1 | 0 | 1 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 50 | 2 | 52 | X |
| | PDP-4 | $ 1,700 | 8/62 | 40 | 5 | 45 | X |
| | PDP-5 | $ 900 | 9/63 | 90 | 10 | 100 | X |
| | PDP-6 | $ 10,000 | 10/64 | 18 | 3 | 21 | X |
| | PDP-7 | $ 1,300 | 11/64 | 123 | 35 | 158 | X |
| | PDP-8 | $ 525 | 4/65 | 1163 | 255 | 1418 | 20 |
| | PDP-9 | $ 1,100 | 12/66 | 251 | 83 | 334 | 25 |
| | PDP-10 | $ 11,000 | 10/67 | 54 | 13 | 67 | 30 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 73 | 31 | 104 | 16 |
| | 8400 | $ 10,000 | 6/65 | 19 | 6 | 25 | 3 |
| EMR Computer | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 17 | 0 | 17 | 1 |
| | ADVNACE 6040 | $ 5,600 | 7/65 | 8 | 3 | 11 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 13 | 4 | 17 | 1 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 31 | 6 | 37 | 18 |
| General Electric | 105 | $ 1,350 | 7/69 | 0 | 0 | 0 | 165 |
| | 115 | $ 2,200 | 12/65 | 440 | 685 | 1125 | 150 |
| | 130 | $ 4,500 | 3/69 | 0 | 0 | 0 | 145 |
| | 205 | $ 2,900 | 6/64 | 12 | 0 | 12 | X |
| | 210 | $ 16,000 | 7/59 | 32 | 0 | 32 | X |
| | 215 | $ 6,000 | 9/63 | 20 | 2 | 22 | X |
| | 225 | $ 8,800 | 4/61 | 144 | 20 | 164 | X |
| | 235 | $ 12,500 | 4/64 | 117 | 25 | 142 | 10 |
| | 405 | $ 6,200 | 2/68 | 48 | 12 | 60 | 35 |
| | 415 | $ 11,000 | 5/64 | 321 | 102 | 423 | 25 |
| | 425 | $ 19,500 | 6/64 | 120 | 36 | 156 | 27 |
| | 435 | $ 27,000 | 9/65 | 34 | 9 | 43 | 12 |
| | 615 | $ 33,000 | 6/69 | 0 | 0 | 0 | 5 |
| | 625 | $ 54,000 | 4/65 | 31 | 5 | 36 | 8 |
| | 635 | $ 62,000 | 5/65 | 44 | 6 | 50 | 24 |
| | 645 | $ 90,000 | 7/66 | 8 | 0 | 8 | 2 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 98 | 31 | 129 | 55 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 45 | 20 | 65 | 5 |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 19 | 2 | 21 | 3 |
| Hewlett-Packard | 2000A | $ 2,500 | 11/68 | 4 | 0 | 4 | 65 |



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AS OF MARCH 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 72 | 2 | 74 | X |
| | DDP-116 | $ 950 | 4/65 | 204 | 44 | 248 | 13 |
| | DDP-124 | $ 2,150 | 3/66 | 46 | 29 | 75 | 10 |
| | DDP-224 | $ 3,600 | 3/65 | 50 | 10 | 60 | 10 |
| | DDP-516 | $ 780 | 9/66 | 230 | 65 | 295 | 160 |
| | H-110 | $ 2,500 | 9/68 | 30 | 10 | 40 | 90 |
| | H-120 | $ 4,200 | 1/66 | 770 | 195 | 965 | 75 |
| | H-125 | $ 5,000 | 12/67 | 100 | 22 | 122 | 110 |
| | H-200 | $ 9,200 | 3/64 | 830 | 350 | 1180 | 75 |
| | H-400 | $ 8,500 | 12/61 | 51 | 38 | 89 | X |
| | H-632 | $ 3,500 | 12/68 | 3 | 0 | 3 | 35 |
| | H-800 | $ 30,000 | 12/60 | 58 | 14 | 72 | X |
| | H-1200 | $ 11,600 | 2/66 | 237 | 61 | 298 | 55 |
| | H-1250 | $ 12,000 | 8/68 | 25 | 7 | 32 | 80 |
| | H-1400 | $ 14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,500 | 1/66 | 126 | 29 | 155 | 70 |
| | H-3200 | $ 18,000 | 2/70 | 0 | 0 | 0 | 3 |
| | H-4200 | $ 20,500 | 9/68 | 4 | 0 | 4 | 22 |
| | H-8200 | $ 50,000 | 2/69 | 1 | 0 | 1 | 8 |
| IBM | 305 | $ 3,600 | 12/57 | 57 | 21 | 78 | X |
| | 360/20 | $ 2,800 | 12/65 | 6000 | 4000 | 10,000 | 2600 |
| | 360/25 | $ 5,330 | 10/68 | 280 | 70 | 350 | 3600 |
| | 360/30 | $ 8,800 | 5/65 | 6100 | 3450 | 9550 | 600 |
| | 360/40 | $ 16,800 | 4/65 | 2640 | 1080 | 3720 | 450 |
| | 360/44 | $ 15,000 | 7/66 | 269 | 56 | 325 | 60 |
| | 360/50 | $ 32,000 | 8/65 | 1060 | 240 | 1300 | 640 |
| | 360/65 | $ 60,000 | 11/65 | 502 | 100 | 602 | 265 |
| | 360/67 | $138,000 | 6/66 | 45 | 10 | 55 | 55 |
| | 360/75 | $ 81,400 | 1/66 | 35 | 8 | 43 | 10 |
| | 360/85 | $155,000 | 10/69 | 0 | 0 | 0 | 23 |
| | 360/90 Series | $150,000 | 11/67 | 11 | 0 | 11 | 8 |
| | 650 | $ 4,800 | 11/54 | 70 | 25 | 95 | X |
| | 1130 | $ 1,700 | 2/66 | 3200 | 1280 | 4480 | 2000 |
| | 1401 | $ 6,200 | 9/60 | 2875 | 1925 | 4800 | X |
| | 1401-G | $ 2,300 | 5/64 | 590 | 610 | 1200 | X |
| | 1401-H | $ 1,300 | 6/67 | 240 | 180 | 420 | X |
| | 1410 | $ 17,000 | 11/61 | 315 | 185 | 500 | X |
| | 1440 | $ 4,100 | 4/63 | 1660 | 1230 | 2890 | X |
| | 1460 | $ 9,800 | 10/63 | 598 | 112 | 710 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 850 | 465 | 1315 | X |
| | 1800 | $ 5,000 | 1/66 | 450 | 160 | 610 | 250 |
| | 7010 | $ 26,000 | 10/63 | 120 | 20 | 140 | X |
| | 702 | $ 6,900 | 2/55 | 3 | 0 | 3 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 16 | 2 | 18 | X |
| | 7040 | $ 25,000 | 6/63 | 66 | 44 | 110 | X |
| | 7044 | $ 36,500 | 6/63 | 64 | 22 | 86 | X |
| | 705 | $ 38,000 | 11/55 | 28 | 5 | 33 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 154 | 84 | 238 | X |
| | 7080 | $ 60,000 | 8/61 | 77 | 3 | 80 | X |
| | 709 | $ 40,000 | 8/58 | 2 | 0 | 2 | X |
| | 7090 | $ 63,500 | 11/59 | 29 | 6 | 35 | X |
| | 7094 I/II | $ 77,300 | 9/62;4/64 | 178 | 12 | 190 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 20 | 2 | 22 | X |
| | NCR-310 | $ 2,500 | 5/61 | 10 | 0 | 10 | X |
| | NCR-315 | $ 9,000 | 5/62 | 532 | 276 | 808 | 20 |
| | NCR-315-RMC | $ 12,500 | 9/65 | 97 | 23 | 120 | 15 |
| | NCR-390 | $ 1,950 | 5/61 | 965 | 465 | 1430 | X |
| | NCR-500 | $ 1,650 | 10/65 | 1715 | 785 | 2500 | 260 |
| | Century-100 | $ 2,645 | 9/68 | 90 | 10 | 100 | 800 |
| | Century-200 | $ 7,500 | 4/69 | 0 | 0 | 0 | 430 |
| Philco | 1000 | $ 7,010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210,211 | $ 40,000 | 10/58 | 12 | 1 | 13 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,500 | 2/61 | 395 | 205 | 600 | X |
| | RCA 3301 | $ 19,000 | 7/64 | 78 | 8 | 86 | X |
| | RCA 501 | $ 14,000 | 6/59 | 74 | 2 | 76 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,500 | 9/65 | 120 | 80 | 200 | 25 |
| | Spectra 70/25 | $ 7,200 | 9/65 | 75 | 40 | 115 | 25 |
| | Spectra 70/35 | $ 8,400 | 1/67 | 113 | 77 | 190 | 80 |
| | Spectra 70/45 | $ 24,000 | 11/65 | 228 | 77 | 305 | 50 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 3 | 0 | 3 | 8 |
| | Spectra 70/55 | $ 35,000 | 11/66 | 14 | 3 | 17 | 10 |
| | Spectra 70/60 | $ 38,000 | 9/70 | 0 | 0 | 0 | 3 |
| Raytheon | 250 | $ 1,200 | 12/60 | 115 | 45 | 160 | X |
| | 440 | $ 3,500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $ 3,200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp | 655 | $ 1,800 | 10/66 | 79 | 0 | 79 | 28 |
| | 660 | $ 2,000 | 10/65 | 13 | 1 | 14 | 8 |
| | 670 | $ 2,600 | 5/66 | 1 | 0 | 1 | 0 |
| | 4700 | $ 800 | 4/69 | 1 | 0 | 1 | 47 |
| | 6700 | $ 16,000 | 11/69 | 0 | 0 | 0 | 1 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 65 | 5 | 70 | X |
| | SDS-910 | $ 2,000 | 8/62 | 175 | 15 | 190 | X |
| | SDS-920 | $ 2,900 | 9/62 | 140 | 20 | 160 | X |
| | SDS-925 | $ 3,000 | 12/64 | 23 | 2 | 25 | X |
| | SDS-930 | $ 3,400 | 6/64 | 145 | 20 | 165 | X |
| | SDS-940 | $ 25,000 | 4/66 | 43 | 3 | 46 | 16 |
| | SDS-9300 | $ 8,500 | 11/64 | 31 | 2 | 33 | X |
| | Sigma 2 | $ 1,800 | 12/66 | 150 | 25 | 175 | 135 |
| | Sigma 5 | $ 7,000 | 8/67 | 58 | 22 | 80 | 65 |
| | Sigma 7 | $ 13,500 | 12/66 | 46 | 12 | 58 | 20 |
| Standard Computer Corp | IC6000 | $ 18,000 | 5/67 | 15 | 0 | 15 | 10 |
| | IC4000 | $ 10,000 | 9/68 | 4 | 0 | 4 | 6 |
| Systems Eng. Labs. | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810 A/B | $900/$1,100 | 8/66;12/68 | 159 | 11 | 170 | 24 |
| | 840 | $ 1,400 | 11/65 | 3 | 0 | 3 | X |
| | 840 A/MP | $1,400/$1,600 | 8/66;10/67 | 50 | 0 | 50 | 18 |
| UNIVAC | I & II | $ 25,000 | 2/51 & 11/57 | 16 | 0 | 16 | X |
| | III | $ 21,000 | 8/62 | 71 | 13 | 84 | X |
| | File Computers | $ 15,000 | 8/56 | 8 | 0 | 8 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 101 | 69 | 170 | X |
| | 418 | $ 11,700 | 6/63 | 101 | 51 | 152 | 12 |
| | 490 Series | $ 32,000 | 12/61 | 179 | 26 | 205 | 22 |
| | 1004 | $ 1,900 | 2/63 | 1690 | 990 | 2680 | X |
| | 1005 | $ 2,550 | 4/66 | 935 | 425 | 1360 | 40 |
| | 1050 | $ 8,800 | 9/63 | 175 | 90 | 265 | X |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1106 | $ 37,000 | 2/70 | 0 | 0 | 0 | 5 |
| | 1107 | $ 57,000 | 10/62 | 19 | 8 | 27 | X |
| | 1108 | $ 68,000 | 9/65 | 131 | 49 | 180 | 110 |
| | 9200 | $ 1,600 | 6/67 | 305 | 95 | 400 | 540 |
| | 9300 | $ 3,600 | 9/67 | 165 | 55 | 220 | 435 |
| | 9400 | $ 7,000 | 5/69 | 0 | 0 | 0 | 125 |
| | LARC | $135,000 | 5/60 | 1 | 0 | 1 | X |
| | | | TOTALS | 47,833 | 22,326 | 70,159 | 16,337 |



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Arpil 21, - May 2, 1969

| | 1969 High | 1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 82 3/4 | 65 1/4 | 1519 | 82 3/4 | 72 3/8 | 78 3/8 | + 4 7/8 | + 6.63 |
| American R & D | 187 | 154 1/2 | 349 | 187 | 164 1/2 | 183 1/4 | +17 5/8 | +10.64 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 6079 | 44 3/4 | 37 1/4 | 44 3/4 | + 6 3/4 | +17.76 |
| Bunker Ramo | 17 5/8 | 12 5/8 | 3048 | 14 3/4 | 12 5/8 | 14 | + 1 1/8 | + 8.73 |
| Burroughs | 130 | 121 1/2 | 1690 | 128 3/8 | 121 1/2 | 126 1/2 | + 3 1/8 | + 1.27 |
| Collins Radio | 69 3/4 | 48 | 2931 | 63 7/8 | 53 | 54 1/8 | + 7 7/8 | +12.70 |
| Computer Sciences | 73 7/8 | 49 | 5945 | 73 7/8 | 61 | 72 | + 9 1/4 | +14.74 |
| Control Data | 158 | 125 1/8 | 4526 | 158 | 136 1/8 | 155 1/2 | +17 1/2 | +12.68 |
| Electronic Assoc. | 25 1/4 | 18 | 1476 | 22 1/8 | 18 | 21 1/4 | + 2 1/2 | +13.33 |
| General Electric | 98 | 85 1/8 | 3471 | 98 | 89 1/2 | 97 5/8 | + 6 5/8 | + 7.28 |
| Honeywell | 140 | 107 3/4 | 1201 | 140 | 128 | 139 1/2 | + 9 1/2 | + 7.31 |
| IBM | 330 1/4 | 291 3/4 | 2495 | 330 1/4 | 305 1/4 | 326 1/2 | +18 1/4 | + 5.92 |
| ITT | 58 1/2 | 48 1/8 | 5316 | 52 3/8 | 48 1/2 | 51 1/8 | - 7/8 | - 1.68 |
| Litton | 74 1/2 | 48 1/4 | 3851 | 57 1/8 | 50 1/2 | 57 | + 4 5/8 | + 8.83 |
| Memorex | 88 1/4 | 65 | 1601 | 88 1/4 | 74 3/4 | 88 1/4 | + 9 1/4 | +11.71 |
| National Cash Register | 133 7/8 | 108 | 2426 | 133 7/8 | 120 1/2 | 133 1/2 | + 9 1/2 | + 7.66 |
| RCA | 48 1/8 | 41 1/4 | 3569 | 48 | 42 3/8 | 46 3/8 | + 2 1/2 | + 5.69 |
| Raytheon | 50 1/4 | 37 5/8 | 1348 | 40 5/8 | 37 5/8 | 40 1/8 | + 1/2 | + 1.27 |
| Sanders | 61 7/8 | 40 | 566 | 45 1/2 | 41 3/4 | 44 1/2 | + 1 3/8 | + 3.19 |
| Scientific Data | 128 | 83 | 5255 | 128 | 108 | 127 | +14 1/4 | +12.64 |
| SCM | 47 1/8 | 38 | 2726 | 45 1/2 | 40 1/4 | 45 1/8 | + 4 1/8 | +10.06 |
| Singer | 84 1/4 | 71 3/4 | 842 | 80 | 74 1/8 | 78 | + 2 5/8 | + 3.48 |
| Sperry Rand | 55 1/2 | 44 1/4 | 5870 | 55 1/2 | 48 3/4 | 54 3/4 | + 4 7/8 | + 9.77 |
| Teledyne | 45 1/2 | 36 1/8 | 3999 | 44 | 36 1/8 | 43 7/8 | + 4 7/8 | +12.50 |
| Xerox | 272 1/8 | 241 | 2358 | 270 1/4 | 241 | 269 | + 9 1/4 | +14.74 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 7.59 | + 8.61 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 83 1/4 | 63 1/4 | 412 | 83 1/4 | 70 3/4 | 81 1/2 | + 9 | +12.41 |
| Calcomp | 37 1/2 | 27 | 654 | 32 | 27 | 31 | + 3/4 | + 2.48 |
| Clary Corp. | 25 3/4 | 18 3/4 | 287 | 21 1/2 | 18 7/8 | 22 3/4 | + 2 1/2 | +12.35 |
| Computer Applications | 21 7/8 | 14 | 339 | 15 3/8 | 14 | 14 7/8 | - 1/2 | - 3.25 |
| Computing and Software | 56 1/4 | 37 | 665 | 56 1/2 | 46 | 54 3/4 | + 7 3/4 | +16.49 |
| Data Proc. Fin. & Gen. | 60 1/4 | 36 3/8 | 1475 | 43 1/8 | 37 3/8 | 37 3/8 | - 5 7/8 | -13.58 |
| Data Products | 27 7/8 | 16 1/2 | 2265 | 20 7/8 | 16 1/2 | 19 7/8 | + 2 | +11.18 |
| Digital Equipment | 175 1/4 | 138 1/2 | 341 | 173 1/2 | 150 | 171 1/2 | +16 1/2 | +10.65 |
| Elect. Comp. Prog. In. | 38 1/4 | 27 | 234 | 31 | 27 7/8 | 29 1/8 | - 3/4 | - 2.51 |
| Granite Computer | 45 1/2 | 26 | 668 | 32 1/2 | 26 | 31 7/8 | + 2 5/8 | + 8.97 |
| Greyhound Computer | 28 5/8 | 19 | 618 | 21 7/8 | 19 | 21 5/8 | + 1 1/4 | + 6.13 |
| Leasco | 54 | 36 | 5321 | 46 5/8 | 37 1/2 | 44 | + 2 1/8 | + 5.07 |
| Levin-Townsend Comp. | 57 1/2 | 34 3/4 | 3110 | 43 | 37 1/8 | 40 | - 2 1/4 | - 5.33 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 561 | 29 1/8 | 24 | 28 | + 3 1/8 | +12.56 |
| Mohawk Data Sciences | 79 | 59 3/4 | 1838 | 79 | 70 5/8 | 76 | + 4 3/4 | + 6.66 |
| Planning Research | 32 1/2 | 23 7/8 | 1298 | 32 1/2 | 27 5/8 | 31 7/8 | + 2 5/8 | + 8.97 |
| Potter Instrument | 35 3/4 | 27 1/8 | 976 | 32 1/8 | 28 1/8 | 30 3/4 | - 3/8 | - 1.20 |
| Randolph Computers | 43 7/8 | 27 1/2 | 502 | 30 1/2 | 27 1/2 | 30 1/8 | + 3/4 | + 2.55 |
| Sys. Eng. Labs. | 36 | 26 1/8 | 1191 | 36 | 31 3/8 | 35 1/4 | + 5 7/8 | +17.80 |
| Telex | 29 7/8 | 20 3/4 | 1337 | 29 7/8 | 25 1/2 | 29 1/2 | + 2 3/4 | +10.28 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 2.73 | + 5.93 |

| | 1969 High Bid | 1969 Low Bid | May 2, Bid | May 2, Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 1/2 | 31 | 35 | 37 | 34 | + 1 | + 2.94 |
| Aries Corp. | 19 | 8 1/2 | 10 | 11 | 9 3/4 | + 1/4 | + 2.56 |
| Bolt, Beranek & Newman, Inc. | 19 | 14 1/2 | 15 1/4 | 16 1/4 | 16 | - 3/4 | - 4.69 |
| Computer Usage | 40 | 24 | 26 1/2 | 27 1/4 | 28 1/4 | - 2 | - 7.02 |
| Cyber-tronics | 12 1/2 | 9 1/8 | 10 | 10 1/2 | 9 7/8 | + 1/8 | + 1.27 |
| Digitronics | 22 1/2 | 15 | 16 | 17 | 16 | -- | -- |
| DPA, Inc. | 16 1/4 | 10 | 14 | 14 3/8 | 10 7/8 | + 3 1/8 | +21.74 |
| Electronic Memories | 62 | 46 | 61 | 62 1/2 | 55 1/2 | + 5 1/2 | + 9.90 |
| Fabri-Tek | 12 7/8 | 10 1/8 | 10 3/8 | 10 7/8 | 10 3/4 | - 3/8 | - 3.48 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 24 3/4 | 25 1/4 | 21 | + 3 3/4 | +17.82 |
| LMC Data, Inc. | 8 1/4 | 4 3/4 | 6 1/4 | 7 | 5 1/4 | + 1 | +19.05 |
| Management Assistance | 14 7/8 | 7 3/4 | 8 5/8 | 8 7/8 | 8 7/8 | - 1/4 | - 2.82 |
| Optical Scanning Corp. | 118 | 54 | 59 | 62 | 65 | - 6 | - 9.23 |
| Recognition Equipment, Inc. | 76 | 54 | 66 | 67 | 64 | + 2 | + 3.13 |
| Tally Corp. | 36 | 22 | 26 | 27 1/2 | 27 1/2 | - 1 1/2 | - 5.45 |
| TBS Computer Centers Corp. | 30 1/2 | 11 | 29 | 20 1/2 | 21 1/2 | + 7 1/2 | +34.88 |
| University Computing | 155 | 76 | 77 | 80 | 93 | -16 | -17.20 |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JUNE 17,1969 o VOL.4,NO.19 P.J.McGOVERN,EDITOR

"Publishing" service for software and data bases

## GE ANNOUNCES $34 MILLION INVESTMENT TO IMPLEMENT NATIONWIDE NETWORK FOR "RAIR" AND OTHER ON-LINE SERVICES

*The concept of a single computer -- as we see its function in our business -- is disappearing. Today, I could count up for you the number of computers we operate; by next year, I really won't be able to distinguish the individual elements within each processing center of a true interconnected international computer network.*

-- Paul W. Sage, General Manager
GE's Information Services Div.

With words such as those above . . . words that almost convey too many futuristic overtones to be coming from practical businessmen . . . several top executives from General Electric's Information Services Division told a group of press representatives about the very realistic program GE is implementing to improve its capabilities for distributed computing. GE at the meeting announced its plans "to invest $34 million this year in a nationwide computing network linking major cities to a grid of communications and computer systems for subscription on-line services."

Even for GE -- with some 40% of the conventional time-sharing market and its equipment base worth an estimated $70 million installed for its U.S. time-sharing operations -- this is a significant investment in a market that may reach the $150 million level during 1969. On the other hand, GE estimates -- and studies by the International Data Corporation, publisher of EDP/IR tend to concur -- that the market being opened by this type system will be in the $1.5 billion to $2 billion annual range by 1975.

GE -- along with a few other companies -- has finally recognized that the future for conventional time sharing, in which GE is the leader, is precarious. There is a growing oversupply of available services; price structures are weakening; many companies in the field have a narrow view of the potential market.

On the basis of IDC studies, EDP/IR continues to think that services based on time-sharing techniques will be important as future business opportunities; we are equally certain that the traditional types of time sharing so touted today are virtually destined to become money-losing adventures for all but a very few companies. There is an increasing necessity for commercial Rair (see EDP/IR, Aug.29, 1968) services to provide either specialized applications knowledge or on-line, manipulable proprietary data bases.

**E|D|P Industry Report and Market Review,** formerly **E|D|P Industry and Market Report,** is published twenty-four times each year by the International Data Publishing Co., 60 Austin Street, Newtonville, Mass. 02160. Entire contents © 1969 by the International Data Corporation. James Peacock, Managing Editor; Fred Anderson, Steven Pease, Associate Editors; William Leitch, Contributing Editor; A. Whelan, Circulation Manager. Editorial ideas and information are collected from numerous industry experts, and are researched and formulated by members of the editorial staff. The information and opinions contained in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. Subscriptions: One Year, $75. Single copies, priced as indicated on inside pages, air-mailed same day requested. Prices for multiple copies available on request. Telephone (617) 969-4020. Reproduction without written permission is completely forbidden.

GE's plans for profit

Even GE, apparently, has realized that the real money isn't in providing access to raw computer power. The company's time-sharing business has never been more than marginally profitable, if that. The first indication that revised thinking was in the works came to light late in 1968, when the company announced a new method of pricing its services: Rather than charge for processing time at a per-second rate, GE decided to charge everything except connect time and storage costs in terms of the Computer Resource Unit. These CRUs are based on the particular software package used so that, for example, seldom-used application packages that cost a lot to produce are priced higher than a standard compiler.

In the planned new network, GE isn't going to curtail any of the services it currently offers. It is, however, going to add or expand in several areas. Here is a rundown on what GE says it will offer:

- Conversational time sharing, GE's original product, will continue to be offered in both the Mark I version on the 265 computer systems and the Mark II version on the 635. The former version caters primarily to the user who needs quick calculations or on-line programming capability; the latter has more memory and data manipulation capability and can handle larger and more involved problems.

- On-line batch processing, a service announced last fall, will be extended across the country. With this system, the user's small computer such as GE's 115 operates over communication lines in connection with the central 635. Essentially, the small, on-site computer acts as the input/output unit for the large computer.

- Application packages, more than 300 of which are currently offered, will be stressed. In addition to developing new ones for specific businesses or industries, GE is obtaining programs developed by its customers for resale through the system. To use such a program, the GE customer would pay the standard system cost plus an agreed-on royalty to the developer of the program. At present, GE says it has a package of financial programs developed by the First National City Bank of New York and group of programs for the petroleum and gas industries. GE is negotiating with other software authors to expand this service.

- Terminal sale and lease activity will be stepped up by GE. Most of its customers presently use Teletype terminals, but the company hopes to shift many of them to its recently announced Terminet 300 teletypewriters and to supply the 115 computer for remote-batch needs.

- Contract services will be provided. For customers who wish it, GE will develop special application programs and also provide personnel to set up and operate a company's in-house computer facility. Thus, one more company moves a step nearer facilities management, one of the glamour portions of the computer industry this year.

- Training for customers will also be provided at computer centers and field offices. In addition to initial courses in the basics of time-sharing use, GE will have follow-up courses in specific applications and advanced programming languages.



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GE's expenditures will be concentrated on setting up a national "tiered" computer system. The first system will be centered in Cleveland, where a 635 will be connected to second-level computers such as the GE-PAC 4020 and the Datanet 30. At the third level will be either GE 115s doing remote-batch processing or Honeywell DDP-416s. On down the network from the 416s are special GE-built concentrators that handle individual customer terminals. Through this communications system, GE will offer local dial-up service in major cities across the U.S.

It is apparent, from the above, that GE has at least announced its way into just about every service area that seems to be profitable in the near future. The emphasis in GE's Rair services will increasingly be shifted toward the preparation and marketing of specialized packages. GE has doubled its field staff since the first of this year, and one of the primary areas it will be selling to is the small business firm who currently uses a service bureau or simply CPA firms. It seems obvious, though unannounced, that emphasis on the traditional area of computational time sharing will be lessened.

The "traditional" market

As EDP/IR has pointed out before, the phrase "time sharing" has been one of the most overworked and misused terms in the computer industry. We now use it only in its traditional sense: Time sharing is the multiple use of a central computer via terminals placed conveniently at a desk or in a laboratory. The terminal usually used is a teleprinter or other keyboard device, or a television-like display device, which usually has a keyboard as well. People using such services are generally doing simple calculations or writing computer programs; in each case, the data input is normally small, the program relatively short, and the computer response is conversational. Each person in the service is using the computer as if it were completely under his control.

Terminals for this type of use -- described by its developers as "intellectual power tools" -- started to be available at certain universities and research institutions in 1963, and by late 1964 the first commercial time-sharing services were started. During 1964, however, there were essentially no commercial revenues from time sharing.

In 1965, time sharing accounted for perhaps $10 million in commercial revenues; it grew to the $25 million or $30 million level by 1967; and the time-sharing market hit the $50 million to $55 million level last year. EDP/IR's publisher, IDC, has conducted several extensive surveys -- talking both to time-sharing users and suppliers -- and we see the market continuing to double for the next few years, reaching the $350 million level by 1971 and doubling again to the $700 million range by 1973. The outlook for 1975 is in the $1 billion area.

An industry undergoing such explosive growth, understandably, is operating in a rapidly changing environment. Every new venture naturally reflects improving technology, and competition obviously arises from more and more outside areas (see story, page 6). When EDP/IR published its Rair report last year, there were about 70 companies that offered time-sharing services; today there are over 150. One reason for this surge of competition is the relative ease with which a company can go into business; also, with continuing improvements in computer capability, the breakeven point for new operations is lower. But it still isn't attractive for most.



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Today, there are over 300 computer systems being used by commercial time-sharing services in this country. As a result of the high concentration of available services, there has been brisk competition, in several forms: price cutting, special inducements for new customers, and special programming assistance. In one sense, there are more services around than there are people who know how to use them. There certainly is an enormous market development problem for the large number of relatively small companies. By the time they get their customers built up to a high volume, they will have run through several years and several millions of dollars and, in many cases, they will have shown only negative profits.

There are basically four types of participants in today's time-sharing marketplace, and each of them has evolved in a reasonably obvious manner. Here is how today's time-sharing participants developed:

- The mainframe manufacturers, with computers readily at their disposal, were naturals. The two most widely used services today -- those offered by GE and by IBM's Service Bureau Corp. -- are run by such companies, and there isn't a major manufacturer that isn't either in the business or preparing for it.

- The second type of company in time sharing -- the company that for several years supplied "traditional" data processing services -- was also a logical entry. And with the possibility of most data processing services being eventually combined into on-line setups, the future for these companies looks as good as that for any of today's participants.

- Third, there are the independent services started up by forward-looking entrepreneurs. Among this group are some of the initial time-sharing services, many of which have struggled along for several years still hoping to show their first black ink. Also in this group are the majority of the new entries in the marketplace.

- The fourth group in a sense is the most interesting. It is composed of organizations which traditionally have been large computer users -- such as aerospace companies, large manufacturers, and banks -- and that have decided they can make some money selling their expertise to others. Just during the past six months or so quite a few such companies have gotten into time sharing, and more activity is to be expected. In operations of this type, profitability is not a major problem because the parent company, in effect, is obtaining partial support for a cost it once bore completely.

What time sharing costs the user

As pointed out in the description of GE's service, changes are to be expected in the pricing of on-line services as more than raw computational power is provided to the user. The bulk of today's time-sharing business, however, continues to follow traditional patterns, and three elements are involved in the price:

- First, there is connect time, which represents the actual time the terminal is connected to the computer. Charges for this range from $7 to $12 per hour on larger systems down to as little as $4 to $5 on some of the newer, small systems that are just going into service.



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- Next, we have computer time . . . the time during which the computer's central processor is actually working on the user's problem. A few services don't charge for compute time, but with those that do the cost ranges from about 3¢ a second up to 40¢, depending on the power of the computer.

- The third element is storage. Monthly costs range from about 50¢ to $2.00 for a thousand characters -- about the amount of information on a double-spaced, typed page -- held in memory. There is a gradual trend toward reducing these costs, thereby encouraging users to maintain information in the computer's auxiliary memory.

The prices mentioned above are list prices, and several forms of discounts are available to many customers. For one thing, schools and institutions are often offered a $4 to $7 hourly connect time rate, with free compute and storage service. This is because schools teach new users, and time-sharing services can hopefully look forward to a steady stream of ex-students as new subscribers. Other services, to keep their systems loaded, offer a flat rate -- about $300 to $500 per month -- with unlimited computing time.

In general, prices have been declining at about 15% a year since the first commercial services were offered. In 1966, for example, the three items listed above cost the typical user about $21 an hour. In 1967, this cost dropped to just above $18, and EDP/IR forecasts that it will decline to about the $13 hourly range this year. This is the result of competitive forces, because the user isn't as concerned about price as he is about other aspects of a service.

In surveys of time-sharing users, we find four factors listed as important considerations, and price shows up as the least important of the four:

- System reliability and availability is what users want most. They want the system to be ready and waiting when they decide to use it -- usually between 9:30 and 11:30 in the morning, then again between 1:30 and 4:00 in the afternoon. Because of this highly cyclical use pattern on the part of business customers, services make their deals with schools and universities, or try to line up business in other parts of the country.

- Program library is rated as the second most important factor. The availability of fully developed application programs usually attracts users to a potential service, and in the future will be one of the key factors that provides any given service with a competitive edge.

- Customer support, service, and individual training rank third for time-sharing users. Although some 75,000 to 100,000 individuals have been trained to use time sharing, a vast additional number need more instruction in Basic, one of the more common languages. In addition, people need to be taught how to apply time sharing to their individual business or profession.

- Price is lowest on the list. To the individual user, price means little, although it is becoming a more important consideration to the organization for whom he works. Some companies are beginning to add up their time-sharing bills and are carefully considering the installation of an in-house system.



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Some companies find they can satisfy their in-house time-sharing needs by installing a so-called "Tinker-Toy" system, using the small, new time-sharing computers offered now by Hewlett-Packard and Digital Equipment. That these can save money for certain computational operations is evident. Commercial services such as Leasco and Time Share Corp. are offering service on these small systems at rates of about $5 per hour.

Outlook for profitability

At this time, time sharing is truly undergoing an important transition. The small computers described above -- and others even less expensive that have been announced -- make it quite easy for a company to have its own system. If it has more sophisticated computational requirements, newer computers such as the PDP-10 or the Honeywell 1648 -- based on published commercial pricing schedules -- seem to be bringing the cost way down.

With the exception of in-house operations, it appears that the business of supplying pure time sharing -- the simple, raw computer power for computation or programming -- will eventually be performed by a few specialized organizations with nationwide networks, and will be done on a low profit-margin basis. Large-scale computers such as the 360/67, Univac's 1108, and the GE 600s finally have operating systems that allow efficient utilization of the lower cost-per-calculation these machines offer. And the networks are being announced and established.

The real future for profitability, however, seems to belong to the companies that are offering the broader type of on-line service that we call Rair. This includes conventional time sharing, but is much broader, and holds out great potential for services such as the house-finding service offered by Realtron, the new airline interchange reservation system called Atars, and the various stock matching services currently in the news.

In 1958, Rair services totalled about $100 million. This year and next, this market will grow relatively slowly as compared to time sharing, but will surge ahead in the early 1970s as new services are dreamed up and more compatible equipment is available. By the mid-1970s the Rair market should be in the $1.5 billion to $2 billion range.

The ideas for Rair services aren't new. Indeed, they were talked about by the originators of time sharing back in the early 1960s. Finally, the equipment for doing this profitably is becoming available. The thing that seems most lacking today is the dearth of broadened thinking on the part of the present -- or potential -- operator of an on-line service. The true potential for on-line computer services will, in all likelihood, be realized by the people who provide specialized software packages or proprietary data bases.

COMPANY SET UP TO PROVIDE TIME-SHARING CENTERS ON FRANCHISE BASIS

Another significant expenditure for time-sharing equipment has been announced. And this one has a couple of new twists. A company called National Computer Franchise Corp. in Chicago plans to purchase 20 Honeywell 1648 time-sharing systems, valued at just over $10 million, and set up franchised centers in 20 major cities across the country, in what will be called the National Computer Network.

Centers in the "network" will get a rather full package that includes the computer, training, specialized software packages, uniform accounting services,



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and a certain amount of national account marketing. To receive this, a prospective center operator must pay $60,000 and have another $140,000 to provide for startup operating losses. He must pay operating expenses, including computer rental of $7000 per month.

National Computer projects, in some very realistic calculations, that it will cost $21,000 to $22,000 a month to run the center. These figures are very much in line with EDP/IR studies that show total operating expense is roughly three times computer rental. The rate of $8 an hour for conversational time sharing compares very closely with what Honeywell charges for similar service through its Information Services & Software Div. But the National concept is also set up for sales of proprietary software packages, via the terminal, at rates of $25 to $30 an hour. Centers will also do batch processing at $50 per hour.

The Honeywell equipment being put in is designed to handle 48 simultaneous users, so National feels safe to project business for the centers based on 40% to 45% machine utilization. Assuming this level is reached about the end of the first year, the centers hit a break-even point after about six months. A 8% to 10% royalty must be paid National after the 8th month. But with these levels of activity, the projections show, the franchise owner can show a profit for the first year and should have an income of over $300,000 during the second year of operation.

The reason profits can be projected in this plan is that proprietary software sales (see story, above) will account for a significant portion of revenues. National already has a flat-stock inventory scheduling package lined up, and is shopping for others. As in the case of GE, National will either buy a package outright or handle it on a royalty basis.

## NEW REGISTRATIONS BY COMPUTER COMPANIES

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| COMPUCOMP CORP. | CompuComp Corp., 421 Hudson St., New York, a company engaged in the application of computer technology to the printing industry, on May 16 filed 200,000 common. The proceeds, at a price to be set by amendment (max. $8 per share), will be used for development, personnel, and equipment. The underwriter will be Baerwald & Deboer, 70 Wall St., New York. |
| COMPUTER DEDUCTIONS, INC. | Computer Deductions, Inc., 1776 Broadway, New York, which offers professional service data processing, on May 13 filed 150,000 common. The proceeds, at a price of $5 per share, will be used for expansion purposes. The underwriter will be A. J. Butler & Co., 50 Broadway, New York. |
| COMPUTER LEARNING AND SYSTEMS CORP. | Computer Learning and Systems Corp., 12303 Twinbrook Parkway, Rockville, Md., a company that operates schools in programming, computer operation, and maintenance, on May 7 filed 340,000 shares of capital stock. The proceeds, at a price to be set by amendment (max. $8 per share), will be used for expansion and improvements. The underwriter will be the First Investment Planning Co., 1500 Mass. Ave., NW, Washington, D.C. |



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May 5, - May 16, 1969

| | 1969 High | 1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 82 3/4 | 65 1/4 | 2412 | 80 1/4 | 73 1/2 | 78 1/2 | + 1/8 | + 0.16 |
| American R & D | 194 3/4 | 154 1/2 | 305 | 194 3/4 | 183 3/4 | 193 1/2 | +10 1/4 | + 5.59 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 3582 | 44 3/4 | 41 1/2 | 43 1/2 | - 1 1/4 | - 2.79 |
| Bunker Ramo | 17 5/8 | 12 5/8 | 4981 | 14 1/8 | 13 1/4 | 13 1/4 | - 3/4 | - 5.36 |
| Burroughs | 135 1/8 | 121 1/4 | 1640 | 135 1/8 | 126 7/8 | 131 3/8 | + 4 7/8 | + 3.85 |
| Collins Radio | 69 3/4 | 48 | 789 | 55 7/8 | 51 1/8 | 55 7/8 | + 1 3/4 | + 3.23 |
| Computer Sciences | 75 7/8 | 49 | 2246 | 75 7/8 | 69 1/2 | 70 | - 2 | - 2.77 |
| Control Data | 159 1/4 | 125 1/8 | 2512 | 159 1/4 | 150 3/4 | 153 3/8 | - 2 1/8 | - 1.37 |
| Electronic Assoc. | 25 1/4 | 18 | 904 | 21 3/4 | 19 7/8 | 21 3/8 | + 1/8 | + 0.59 |
| General Electric | 98 1/4 | 85 1/4 | 3001 | 98 1/4 | 94 1/4 | 96 3/4 | - 7/8 | - 0.90 |
| Honeywell | 140 3/4 | 107 3/4 | 745 | 140 3/4 | 132 1/2 | 134 5/8 | - 4 7/8 | - 3.49 |
| IBM | 334 7/8 | 291 3/4 | 1672 | 334 7/8 | 325 1/8 | 330 1/2 | + 4 | + 1.23 |
| ITT | 58 1/2 | 48 1/8 | 5164 | 55 3/8 | 50 7/8 | 55 | + 3 7/8 | + 7.57 |
| Litton | 74 1/2 | 48 1/4 | 2224 | 57 7/8 | 53 5/8 | 54 7/8 | - 2 1/8 | - 3.73 |
| Memorex | 89 3/4 | 65 | 1060 | 89 3/4 | 83 | 87 1/4 | - 1 | - 1.13 |
| National Cash Register | 139 3/8 | 108 | 1079 | 139 3/8 | 132 | 134 1/4 | + 3/4 | + 0.56 |
| RCA | 48 1/8 | 41 1/4 | 4426 | 47 7/8 | 46 | 47 3/8 | + 1 | + 2.16 |
| Raytheon | 50 1/4 | 37 5/8 | 1880 | 40 3/4 | 38 | 38 3/8 | - 1 3/4 | - 4.36 |
| Sanders | 61 7/8 | 40 | 569 | 47 3/4 | 42 3/4 | 46 5/8 | + 2 1/8 | + 4.77 |
| Scientific Data | 134 7/8 | 83 | 1855 | 134 7/8 | 126 3/4 | 134 | + 7 | + 5.51 |
| SCM | 47 1/8 | 38 | 1371 | 45 3/8 | 41 3/4 | 43 1/8 | - 2 | - 4.43 |
| Singer | 84 1/4 | 71 3/4 | 1506 | 81 7/8 | 77 | 81 5/8 | + 3 5/8 | + 4.64 |
| Sperry Rand | 55 1/2 | 44 1/4 | 3690 | 55 | 51 3/4 | 53 1/4 | - 1 1/2 | - 2.74 |
| Teledyne | 45 1/2 | 36 1/8 | 2756 | 44 3/8 | 39 5/8 | 40 | - 3 7/8 | - 8.83 |
| Xerox | 275 7/8 | 241 | 1576 | 275 7/8 | 268 7/8 | 272 7/8 | + 3 7/8 | + 1.44 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 0.76 | + 0.24 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 83 1/4 | 63 1/4 | 127 | 82 5/8 | 77 5/8 | 81 5/8 | + 1/8 | + 0.15 |
| Calcomp | 37 1/2 | 27 | 490 | 37 1/8 | 30 1/4 | 33 3/8 | + 2 3/8 | + 7.66 |
| Clary Corp. | 25 3/4 | 18 1/2 | 310 | 19 3/4 | 18 1/2 | 19 1/4 | - 3 1/2 | -15.38 |
| Computer Applications | 21 7/8 | 14 | 459 | 19 7/8 | 14 7/8 | 17 | + 2 1/8 | +14.29 |
| Computing and Software | 56 3/8 | 37 | 237 | 56 3/8 | 50 3/4 | 53 7/8 | - 7/8 | - 1.60 |
| Data Proc. Fin. & Gen. | 60 1/4 | 34 | 1545 | 38 1/4 | 31 5/8 | 36 1/8 | - 1 1/4 | - 3.34 |
| Data Products | 27 7/8 | 16 1/2 | 1625 | 19 7/8 | 17 1/8 | 17 3/8 | - 1 1/2 | - 7.54 |
| Digital Equipment | 188 1/2 | 138 1/2 | 273 | 188 1/2 | 173 1/2 | 185 | +13 1/2 | + 7.87 |
| Elect. Comp. Prog. In. | 38 1/4 | 27 | 220 | 30 | 28 1/8 | 28 3/4 | + 3/8 | + 1.29 |
| Granite Computer | 45 1/2 | 26 | 534 | 36 1/4 | 31 | 36 | + 4 1/8 | +12.94 |
| Greyhound Computer | 28 5/8 | 19 | 301 | 23 | 20 5/8 | 20 3/4 | - 7/8 | - 4.05 |
| Leasco | 54 | 36 | 14390 | 46 3/8 | 36 | 38 3/4 | - 5 1/4 | -11.93 |
| Levin-Townsend Comp. | 57 1/2 | 34 3/4 | 1633 | 40 7/8 | 37 1/2 | 39 | - 1 | - 2.50 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 1503 | 34 | 25 3/4 | 26 1/8 | - 1 7/8 | - 6.69 |
| Mohawk Data Sciences | 82 | 59 3/4 | 1665 | 82 | 76 1/8 | 79 1/2 | + 3 1/2 | + 4.61 |
| Planning Research | 33 5/8 | 23 7/8 | 603 | 33 5/8 | 30 | 30 5/8 | - 1 1/4 | - 3.92 |
| Potter Instrument | 35 3/4 | 27 1/8 | 837 | 33 7/8 | 30 5/8 | 32 5/8 | + 1 7/8 | + 6.10 |
| Randolph Computers | 43 7/8 | 27 1/2 | 626 | 30 3/8 | 28 | 29 3/8 | - 3/4 | - 2.49 |
| Sys. Eng. Labs. | 36 | 26 1/8 | 324 | 26 1/4 | 23 5/8 | 32 1/2 | - 2 3/4 | - 7.80 |
| Telex | 33 3/4 | 20 3/4 | 3116 | 33 3/4 | 29 1/2 | 32 5/8 | + 3 1/8 | +10.59 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 0.51 | + 0.09 |

| | 1969 High Bid | 1969 Low Bid | May 16, Bid | May 16, Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 36 1/2 | 31 | 34 | 36 | 35 | - 1 | - 2.86 |
| Aries Corp. | 19 | 8 1/2 | 9 3/4 | 10 1/2 | 10 | - 1/4 | - 2.50 |
| Bolt, Beranek & Newman, Inc. | 19 | 14 1/2 | 15 | 15 3/4 | 15 1/4 | - 1/4 | - 1.64 |
| Computer Usage | 40 | 24 | 27 | 28 | 26 1/2 | + 1/2 | + 1.89 |
| Cyber-tronics | 12 1/2 | 9 1/8 | 10 7/8 | 11 3/8 | 10 | + 7/8 | + 8.75 |
| Digitronics | 22 1/2 | 15 | 17 | 18 | 16 | + 1 | + 6.25 |
| DPA, Inc. | 16 1/4 | 10 | 13 1/8 | 13 1/2 | 14 | - 7/8 | - 6.25 |
| Electronic Memories | 62 | 46 | 58 | 59 1/2 | 61 | - 3 | - 4.92 |
| Fabri-Tek | 12 7/8 | 10 | 11 1/4 | 11 3/4 | 10 3/8 | + 7/8 | + 8.43 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 28 | 29 | 24 3/4 | + 3 1/4 | +13.13 |
| LMC Data, Inc. | 8 1/4 | 4 3/4 | 6 3/4 | 7 1/2 | 6 1/4 | + 1/2 | + 8.00 |
| Management Assistance | 14 7/8 | 7 3/4 | 8 3/4 | 9 | 8 5/8 | - 1/8 | - 1.44 |
| Optical Scanning Corp. | 118 | 54 | 60 | 63 | 59 | + 1 | + 1.69 |
| Recognition Equipment, Inc. | 76 | 54 | 67 | 68 | 66 | + 1 | + 1.52 |
| Tally Corp. | 36 | 22 | 25 1/2 | 27 | 26 | - 1/2 | - 1.92 |
| TBS Computer Centers Corp. | 36 | 11 | 36 | 38 | 29 | + 7 | +24.14 |
| University Computing | 155 | 68 | 77 | 80 | 77 | -- | -- |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 14,1969 • VOL.4,NO.20 P.J.McGOVERN,EDITOR

Providing for more from less?

## SHARP COST INCREASES EXPECTED FROM IBM'S UNBUNDLING

"In keeping with its public statement made last December," IBM announced its so-called unbundling policy in a hand-delivered press release package that described a "new way of doing business" by its Data Processing Division. The new policy does make quite a radical change in the way IBM does business, in fact, and by the time all the twists and wrinkles are ironed out, the computer marketplace will be covered with a whole new cloth.

The scope of IBM's unbundling action was broad indeed, with only maintenance and some very basic software retained as part of the machine price. The reduction in price, however, is very slight, and this comes as a relative shock to many industry observers. They read IBM's announcement to mean quite a steep increase in the user's data processing costs.

Under the new pricing scheme, IBM has added several additional income sources for tapping its existing base of customers. Thus, it would be quite possible for IBM to achieve greater revenues from a smaller share of the computer market. Here's a rundown on unbundled pricing:

- All systems engineering services -- the technical help offered "to assist customers in the installation and application of data processing systems" -- will now be charged at an hourly rate.

- Education, previously considered one of the important "give-aways" in IBM's marketing package, will also be charged to the customer. Prices seem based more on what the market will bear than on the actual cost to IBM. This move shocked users most in EDP/IR's initial survey of computer customers.

- Almost all new software -- including all Type II programs and other new basics such as sorts or compilers -- will be redefined as a "program product" and as such is available to users under a license agreement, essentially equivalent to monthly rental.

- Under a new type service, called custom contract services, IBM will "assume responsibility for performance of specified tasks, such as the design and installation of a data processing system." This move, essentially, could put IBM into competition with the facilities management companies currently in vogue.

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All of the price changes listed above are effective immediately for new orders and will become effective Jan. 1, 1970 for customers with computer systems currently installed or on order. Along with the announcement of this pricing separation, IBM also said that it is reducing the lease and purchase prices of its computer equipment by approximately three percent. This reduction is retroactive to June 16 for purchased equipment, and becomes effective Oct. 1 for customers with equipment on rental.

Some implications of unbundling

Until computer users start paying unbundled prices and competitive forces develop within the marketplace, the exact rules of the new game will not be known. As this happens during the next few months, EDP/IR will devote several issues to examining the effects of unbundling on various portions of the computer industry. At this time, however, there are some general observations which give a reasonable indication of what is to be expected:

- The actions taken by IBM represent a price increase of at least 5%, and this increase could well grow to 30% above current prices within a year.

- Unbundling marks a definite change in the revenue structure of the computer industry. In the future, the importance of hardware revenue will be lessened and there will be a compensating major shift of emphasis toward service revenue.

- In light of the first two items, IBM apparently has decided to continue to concentrate its efforts at achieving systematic growth in profits, even if these come from a smaller share of the marketplace. Thus, the growth rate in equipment deliveries could drop.

- The attention of the IBM salesman will be concentrated -- at least for the short term -- on software and systems engineering services. As a result of this, the salesman may for the first time gain a true insight into the application problems of his user.

- Because of the separate pricing schedules and the probable increased costs, the user will have a tremendous economic incentive to gain a firm grasp on his entire data processing costs.

- Early reports are that new products expected for System/360 will not be introduced until next year. This will definitely have the effect of teaching IBM salesmen to be "tigers" in the software market as they traditionally have been with hardware.

Every industry firm that has spoken out has expressed at least limited approval over IBM's new direction. In one sense, it would seem to us, IBM has broadened its umbrella to protect more of the computer industry than was previously the case. Also, although it is really too early to tell for sure, the initial reactions are that IBM's actions will lessen pressure from the companies that are sueing under antitrust laws, and perhaps set a pattern for the eventual agreement between IBM and the Justice Department. On these points, only time will tell. In the remainder of this issue of EDP/IR there is a full presentation of exactly what IBM has announced to date, some of the initial reactions, and our preliminary analysis. More will follow during the summer.



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## The prices the users will pay

All the costs under IBM's new separate pricing are not known. For the record, however, some initial figures have been provided by the company:

- Systems engineers will be billed on the basis of the type of computer they are called on to work with. Basic systems service (the 1130, 360/20, etc.) will cost $66 for a "half-day," three-hour unit plus $22 per extra hour; general systems will be billed at $84 for the initial unit plus $28 per additional hour; and complex systems (360/65s and larger, plus the 1800 process computer) will run the user $105 plus $35 for each additional hour after the minimum period.

- More than 50 "professional-level" classroom courses will be offered for a charge, with courses announced before these new policies continuing to be free until the first of next year. IBM's charges for its professional courses will "vary widely according to content." A couple of examples offered by IBM are: "System/360 Operating System Advanced Coding," for $460 per student, and "System/360 Continuous System Modeling Program," for $170 per student.

- Program products, to use IBM's new terminology, will vary even more in price. These will be licensed for a designated central processing unit, and "the customer may use the same program on additional CPUs by paying for an additional license for each CPU." At present, monthly charges have been established for 18 programs; more will be added as time passes. The charges vary from $1500 a month for IBM's "Generalized Information System," down through $600 a month for its "Information Management System," to $125 for an "Order Allocation System" and $50 for "Medical Information System, Version II."

## Reaction from the competition

Speculation about the nature and timing of IBM's announcement had been Topic One for weeks to most people in the computer industry. Therefore, once the announcement was made, EDP/IR started talking to both computer companies and users throughout the industry. Most people by now realize the importance of IBM's announcement, and companies in the computer industry have begun to plan their marketing strategies. Not many have announced them.

Most of the other computer manufacturers remain quiet. Burroughs had already essentially prepared its move into the separate pricing area by announcing that application packages for several of its accounting machines as well as the TC 500 could be acquired separately. In a statement quickly following the IBM release, Ray McDonald, president of Burroughs, said: "We feel that the customer should know how much he is paying for basic equipment, and that he should have complete latitude in selecting the amount and type of software that best fits his requirements. In accordance with our program, we are preparing a pricing policy for larger EDP systems which will separate hardware, software, and service charges. We have informed present and prospective users that they will have the option of applying such a policy to their contracts when it is announced." Nothing more has been announced.

Honeywell was the only other manufacturer to make a statement in reaction to the IBM decision and this came over a week after IBM's initial release.



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Essentially, Honeywell announced that it will maintain its original pricing policy for computer systems and will raise rental prices by approximately one percent, "reflecting rising costs of labor, materials, and interest." It also pointed out that adjustments in maintenance rates will be made for purchased systems. Honeywell emphasized that existing customers will probably not be affected during the term of their current agreement.

It is expected that the other manufacturers -- perhaps even Honeywell -- will announce some form of separate pricing before this year is over, or at least shortly following January 1, when IBM discloses its new sales plan.

The user looks like the big loser

Until users gain some practical experience operating with unbundled pricing, there is no way to measure the amount of cost increases or decreases. It would appear reasonable that costs will start off minimally higher, then increase as more and more program products are introduced . . . and as IBM salesmen become more adept at selling software and services.

To assist readers in evaluating possible increases in cost, we have reprinted here our analysis of how IBM had allocated costs to customers under its bundled operation (EDP/IR Apr.4,1969). If these estimates are correct, the portions of cost that have been unbundled -- software, custom system analysis, and education -- represent 25% of the customer's cost. These figures should still be useful in examining the possible cost of unbundled services.

Under IBM's new policies, the user essentially will be getting only the equipment and the maintenance portions of the total package he once received -- the items on the top and bottom lines of the accompanying table. Thus, it would appear the IBM customer will soon be paying 97% for what he previously paid 75%. There is a question, of course, as to how much additional service the customer will purchase from IBM. But it seems reasonable to EDP/IR that the typical

ESTIMATED ALLOCATION OF COSTS TO CUSTOMERS

| | Direct | R&D | Marketing | Admin. | Total | Total |
|---|---|---|---|---|---|---|
| Equipment (Manufacturing and Engineering + 1/2 Software Development) | 24.5 | 3 | 10.5 | 6 | 44 | 58.5 |
| Software (Customer Support-Software + 1/2 Software Development) | 5 | | 2 | 1.25 | 8.25 | 11 |
| Customer Support-Custom System Analysis | 4.5 | 1 | 2 | 1 | 8.5 | 11.5 |
| Customer Support-Education | 1 | | .5 | .25 | 1.75 | 2.5 |
| Maintenance | 10 | | | 2.5 | 12.5 | 16.5 |

THESE FIGURES ARE ESTIMATES PREPARED BY THE INTERNATIONAL DATA CORPORATION



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customer will buy at least 1/3 of the total amount he was getting previously. In that case, the simple dollars and cents point out that the customer's expenses for software, education, and systems engineering will start out at something like 6% to 10% above what he is now paying and probably will rise within the next year to the current level . . . giving essentially a cost increase of about 30% over what is being paid today.

It would seem to EDP/IR that the very large installations probably will have the least increase in costs, especially over the short term. The small and medium sized installations with their limited in-house resources will probably see their costs rising more rapidly. This is particularly probable in light of the fact that IBM -- for the next six months -- has given its salesmen a 10% commission on any systems engineering services that are sold.

The implication of this would appear to be that software marketing will become a real "dog-fight" situation, and perhaps that IBM will attempt to keep its income flow sustained by selling of SE services and software packages rather than pushing equipment already marketed for over five years. Around January 1, 1970, IBM is expected to announce a big package of equipment and to put into effect a new sales plan designed for unbundled selling.

New personnel requirements

Under unbundling, there will be several changes in the personnel requirements for operating computer centers, and there will probably be much more emphasis on personnel selection and training. For one thing, the "data processing manager" will soon have to become a new type of person. Previously, the DP Manager simply had to select the best vendor and then go about making sure he was delivered what was promised.

Very shortly, however, this job will be one of evaluating equipment, software, education, and other types of services, and could well challenge the DP Manager in many ways that were not required before. Add to this the fact that we will probably have a proliferation of software and support companies, and the personnel requirement rapidly is for the type person who even today is in very short supply. This might encourage the growth of so-called "facilities management" companies and/or benefit IBM's new custom contract services operation.

General effects on business

Indeed, facilities management companies -- or IBM with its custom contract services -- may well offer the only practical prospect for small and medium-scale users to have reasonable control over their computer costs. Some facilities management companies have voiced complaints about IBM's possible competition, but it seems to EDP/IR that the positive or umbrella effect of IBM's entry into the field will be more helpful than harmful to competitors.

Generally speaking, our current analysis indicates that IBM probably has made it easier -- or at least no harder -- for most companies in the computer industry to compete successfully. On the other hand, IBM doesn't seem to have done anything that will hurt its position, and it could well have made a move that will bring to it, and perhaps most other companies in the industry, more revenues, at least over the short term. And the user may have a chance to benefit. As IBM competes with other software suppliers, the added value of its products may well offset the increased costs to the user.



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## Details of IBM's announcement

In its press release, IBM describes the history, rationale, and details of its pricing changes. This announcement, which EDP/IR considers significant, is reprinted below. We have underlined phrases of exceptional interest:

ARMONK, N.Y., June 23 . . . In keeping with its public statement made last December, International Business Machines Corporation announced today that certain systems engineering activities, most future computer programs, and most customer education courses, previously furnished without charge, will now be offer for a charge in the United States. Generally, these changes are effective immediately for new orders and will become effective January 1, 1970, for customers with machines installed or on order.

Coincident with this action, the company is reducing data processing equipment lease and purchase prices by approximately three percent. New purchase prices are effective for all equipment installed on or after June 16, 1969. Ne lease prices are effective October 1, 1969.

This price reduction reflects IBM's best approximation of those marketing expenses which will no longer be provided for in prices of currently announced equipment. This new method of doing business by the company's Data Processing Division does not represent a general price increase or decrease. The effect upon individual customers will vary. Many of IBM's customers will be able to take full advantage of the full amount of the equipment price decrease, while others will find their cost of data processing has increased, although their payments IBM will not necessarily increase. IBM does not anticipate an increase in its revenues over the short term as a result of these actions.

IBM announced last December that a study had been underway which was expect to lead to changes by July 1, 1969, in the way the company charged for and supported its data processing equipment. This study was initiated prior to the fi ing of lawsuits against the company by the Department of Justice and several others, attacking the furnishing of programs, systems engineering and other services without charge. The extensive charges announced today have taken into account complaints and opinions from others in the industry and from the Governme

Because these changes represent such a significant departure from past prac tices, there will be a six-month transition period -- ending December 31, 1969 - so that IBM and its customers can make the necessary adjustments to the new environment. During the transition period, customers with equipment installed or on order will continue to receive, without charge, data processing education, as well as systems engineering services to the extent such services have been mutually planned by IBM and the user.

The practice of furnishing customer support without charge dates back to th earliest days of the punched card industry. With the advent of the computer, IB in common with other computer manufacturers, carried on this practice and furnished systems engineering assistance, programs and education as a part of its marketing activities. Through this means, the company stated, computer manufacturers have been able to assure more effective use of new and complex machines b their customers. This approach also has facilitated the open interchange of programming concepts, which has been so vital to data processing users. The unprecedented expansion in the use of data processing equipment has been aided greatly by this support from manufacturers.



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Although predictions for the future in a field as young and volatile as the computer industry are hazardous, there are a number of indications that pricing of services ultimately will become an industry practice. These include:

1. Business opportunities for IBM and others, developing out of the growing need for increasingly complex and comprehensive systems support;

2. The increasing support requirements arising from the relocation and reapplication of a large number of systems owned by others;

3. A limited but increasing number of enterprises engaged in the development of computer programs for sale.

Highlights of today's announcement:

-- Systems engineering services, available for a charge, are provided to assist a customer in the installation and application of his IBM data processing system and to increase the customer's overall data processing proficiency. Services are offered in three skill classifications based on the complexity of the equipment and the way it is used in an operating environment. The services will be scheduled in half-day units.

-- Professional courses designed to assist users of IBM equipment in the education of their employees are offered for a charge. Course prices vary widely, depending on course content. Although IBM does not intend to solicit applications for its data processing education courses from the general public, it will accept applications from anyone meeting course prerequisites.

-- Program products, as distinct from system control programming, will be copyrighted and offered for a monthly charge under a license agreement. Program products contain logic directly related to the computer user's data and enable a system to accomplish a specific end result for the user. Each license will permit the customer to use a program product on a single designated central processing unit. Charges for program products will vary widely. System control programming is an essential part of a data processing system. It is fundamental to the operation and maintenance of the system and will be made available as part of the system. All programs currently available from IBM's program library continue to be in the public domain and available as in the past.

-- Custom contract services, a new offering, also was announced. Under a custom contract, IBM will assume responsibility for the performance of specified tasks in the areas of systems design and analysis, application and program development and systems installation and evaluation.

IBM's Field Engineering Division will continue to maintain both purchased and leased equipment in the same manner as in the past. As a result of today's changes, the Field Engineering Division also will assume a broader role in providing services for IBM programming. This includes responsibility for furnishing field services on all IBM-supported programming and responding to emergency calls on all other programming used on IBM systems.



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| NEW YORK STOCK EXCHANGE | 1969 High | 1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| Addressograph-Multigraph | 82 3/4 | 65 1/4 | 1068 | 80 1/2 | 76 | 79 1/4 | + 1 1/8 | + 1.44 |
| American R & D | 204 3/4 | 154 1/2 | 319 | 204 3/4 | 185 1/4 | 194 1/2 | + 1 | + 0.52 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 2195 | 43 7/8 | 40 | 41 7/8 | - 1 3/8 | - 3.18 |
| Bunker Ramo | 17 5/8 | 12 5/8 | 1974 | 14 1/8 | 13 | 13 | - 1/4 | - 1.88 |
| Burroughs | 135 1/8 | 121 1/2 | 1211 | 133 1/2 | 122 1/4 | 124 1/4 | - 7 1/8 | - 5.42 |
| Collins Radio | 69 3/4 | 48 | 1195 | 56 1/8 | 52 1/8 | 53 3/4 | - 2 1/8 | - 3.80 |
| Computer Sciences | 75 7/8 | 49 | 789 | 73 | 68 3/4 | 70 1/4 | + 1/4 | + 0.36 |
| Control Data | 159 1/4 | 125 1/8 | 1591 | 154 1/2 | 146 | 148 5/8 | - 4 3/4 | - 3.10 |
| Electronic Assoc. | 25 1/4 | 18 | 934 | 23 5/8 | 20 3/4 | 20 7/8 | - 1/2 | - 2.39 |
| General Electric | 98 1/4 | 85 1/8 | 2329 | 97 1/8 | 93 1/2 | 94 1/4 | - 2 1/2 | - 2.58 |
| Honeywell | 140 3/4 | 107 3/4 | 692 | 135 3/8 | 130 3/4 | 132 1/4 | + 1/4 | + 0.19 |
| IBM | 334 7/8 | 291 3/4 | 1415 | 329 | 318 1/4 | 319 | -11 1/2 | - 3.48 |
| ITT | 58 1/2 | 48 1/8 | 2714 | 56 | 53 | 54 1/2 | - 1/4 | - 0.46 |
| Leasco | 54 | 36 | 4780 | 40 1/4 | 36 3/8 | 36 5/8 | - 2 1/8 | - 5.48 |
| Litton | 74 1/2 | 48 1/4 | 2574 | 54 7/8 | 52 1/8 | 53 1/8 | - 1 3/4 | - 3.19 |
| Memorex | 89 3/4 | 65 | 514 | 88 1/2 | 84 5/8 | 86 | - 1 1/4 | - 1.43 |
| National Cash Register | 139 3/8 | 108 | 720 | 134 3/4 | 126 1/2 | 130 | - 4 1/4 | - 3.17 |
| RCA | 48 1/8 | 41 1/4 | 2663 | 47 3/8 | 44 1/2 | 44 | - 3 3/8 | - 7.12 |
| Raytheon | 50 1/4 | 36 5/8 | 844 | 38 7/8 | 36 5/8 | 37 7/8 | - 1/2 | - 1.30 |
| Sanders | 61 7/8 | 37 1/8 | 3232 | 46 1/2 | 37 1/8 | 37 1/8 | - 9 1/2 | -20.38 |
| SCM | 47 1/8 | 38 | 1460 | 44 1/4 | 40 3/4 | 41 3/8 | - 1 3/4 | - 4.06 |
| Singer | 84 1/4 | 71 3/4 | 1120 | 81 3/4 | 76 1/8 | 78 5/8 | - 3 | - 3.68 |
| Sperry Rand | 55 1/2 | 44 1/2 | 2400 | 53 7/8 | 50 3/4 | 52 1/8 | - 1 1/8 | - 2.11 |
| Teledyne | 45 1/2 | 36 1/8 | 2577 | 40 3/4 | 37 1/8 | 37 3/4 | - 2 1/4 | - 5.63 |
| Xerox | 275 7/8 | 241 | 1345 | 275 1/2 | 261 | 274 1/2 | + 1 5/8 | + 0.59 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 1.36 | - 3.13 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 83 1/4 | 63 1/4 | 96 | 82 7/8 | 79 1/2 | 81 7/8 | + 1/4 | + 0.31 |
| Calcomp | 37 1/2 | 27 | 502 | 33 1/4 | 31 1/8 | 31 7/8 | - 1 1/2 | - 4.71 |
| Clary Corp. | 25 3/4 | 17 | 382 | 19 1/2 | 17 | 17 7/8 | - 1 3/8 | - 7.14 |
| Computer Applications | 21 7/8 | 14 | 199 | 17 | 15 1/4 | 15 1/2 | - 1 1/2 | - 8.82 |
| Computing and Software | 56 3/8 | 37 | 467 | 54 | 48 | 51 | - 2 7/8 | - 5.34 |
| Data Proc. Fin. & Gen. | 60 1/4 | 31 5/8 | 1191 | 42 1/4 | 35 1/8 | 40 | + 3 7/8 | +10.73 |
| Data Products | 27 7/8 | 16 1/2 | 1349 | 18 1/2 | 16 5/8 | 17 | - 3/8 | - 2.26 |
| Digital Equipment | 205 | 138 1/2 | 196 | 205 | 179 | 198 | +13 | + 7.03 |
| Elect. Comp. Prog. In. | 38 1/4 | 21 5/8 | 203 | 28 1/2 | 21 5/8 | 22 1/4 | - 6 1/2 | -22.61 |
| Granite Computer | 45 1/2 | 26 | 419 | 35 3/4 | 32 3/8 | 32 3/8 | - 3 5/8 | -10.07 |
| Greyhound Computer | 28 5/8 | 19 | 220 | 20 5/8 | 19 1/4 | 19 1/4 | - 1 1/2 | - 7.23 |
| Levin-Townsend Comp. | 57 1/2 | 34 3/4 | 986 | 39 5/8 | 36 | 36 5/8 | - 2 3/8 | - 6.09 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 727 | 26 5/8 | 23 1/2 | 24 1/4 | - 1 7/8 | - 7.18 |
| Mohawk Data Sciences | 82 | 59 3/4 | 886 | 79 1/8 | 73 1/8 | 75 3/4 | - 3 3/4 | - 4.72 |
| Planning Research | 33 5/8 | 23 7/8 | 573 | 32 1/4 | 30 | 30 3/8 | - 1/4 | - 0.82 |
| Potter Instrument | 35 3/4 | 27 1/8 | 899 | 34 3/4 | 31 1/8 | 31 1/4 | - 1 3/8 | - 4.21 |
| Randolph Computers | 43 7/8 | 26 3/4 | 466 | 29 1/2 | 26 3/4 | 26 7/8 | - 2 1/2 | - 8.51 |
| Sys. Eng. Labs. | 36 | 26 1/8 | 541 | 35 1/4 | 31 1/2 | 35 1/4 | + 2 3/4 | + 7.24 |
| Telex | 37 5/8 | 20 3/4 | 1854 | 37 5/8 | 32 | 36 1/8 | + 2 1/2 | + 7.43 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 0.47 | - 3.52 |

| OVER-THE-COUNTER | 1969 High Bid | 1969 Low Bid | May 18, Bid | May 18, Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 39 1/2 | 31 | 39 1/2 | 41 1/2 | 34 | + 5 1/2 | +16.17 |
| Aries Corp. | 19 | 7 3/4 | 9 3/4 | 10 1/2 | 9 3/4 | -- | -- |
| Bolt, Beranek & Newman, Inc. | 19 | 14 1/2 | 15 | 16 | 15 | -- | -- |
| Computer Usage | 40 | 23 1/2 | 24 | 25 | 27 | - 3 | -11.11 |
| Cyber-tronics | 12 1/2 | 9 1/8 | 9 3/4 | 10 1/4 | 11 1/4 | - 1 1/2 | -13.33 |
| Digitronics | 22 1/2 | 15 | 15 1/2 | 16 1/2 | 17 | - 1 1/2 | - 8.82 |
| DPA, Inc. | 16 1/4 | 10 | 12 | 12 3/8 | 13 1/8 | - 1 1/8 | - 8.57 |
| Electronic Memories | 62 | 46 | 55 | 56 | 58 | - 3 | - 5.17 |
| Fabri-Tek | 12 7/8 | 10 | 10 3/4 | 11 1/4 | 11 1/4 | - 1/2 | - 4.44 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 29 | 29 3/4 | 28 | + 1 | + 3.57 |
| LMC Data, Inc. | 8 1/4 | 4 3/4 | 5 3/4 | 6 1/2 | 6 3/4 | - 1 | -14.81 |
| Management Assistance | 14 7/8 | 7 1/8 | 7 5/8 | 8 | 8 3/4 | - 1 1/8 | -12.83 |
| Optical Scanning Corp. | 118 | 54 | 58 | 61 | 60 | - 2 | - 3.33 |
| Recognition Equipment, Inc. | 76 | 54 | 63 | 64 | 67 | - 4 | - 5.97 |
| Tally Corp. | 36 | 22 | 24 | 26 | 25 1/2 | - 1 1/2 | - 5.88 |
| TBS Computer Centers Corp. | 36 | 11 | 30 | 32 | 36 | - 6 | -16.67 |
| University Computing | 155 | 68 | 72 | 74 | 77 | - 5 | - 6.49 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 14,1969 • VOL.4,NO.20 P.J.McGOVERN,EDITOR

Providing for more from less?

## SHARP COST INCREASES EXPECTED FROM IBM'S UNBUNDLING

"In keeping with its public statement made last December," IBM announced its so-called unbundling policy in a hand-delivered press release package that described a "new way of doing business" by its Data Processing Division. The new policy does make quite a radical change in the way IBM does business, in fact, and by the time all the twists and wrinkles are ironed out, the computer marketplace will be covered with a whole new cloth.

The scope of IBM's unbundling action was broad indeed, with only maintenance and some very basic software retained as part of the machine price. The reduction in price, however, is very slight, and this comes as a relative shock to many industry observers. They read IBM's announcement to mean quite a steep increase in the user's data processing costs.

Under the new pricing scheme, IBM has added several additional income sources for tapping its existing base of customers. Thus, it would be quite possible for IBM to achieve greater revenues from a smaller share of the computer market. Here's a rundown on unbundled pricing:

- All systems engineering services -- the technical help offered "to assist customers in the installation and application of data processing systems" -- will now be charged at an hourly rate.

- Education, previously considered one of the important "give-aways" in IBM's marketing package, will also be charged to the customer. Prices seem based more on what the market will bear than on the actual cost to IBM. This move shocked users most in EDP/IR's initial survey of computer customers.

- Almost all new software -- including all Type II programs and other new basics such as sorts or compilers -- will be redefined as a "program product" and as such is available to users under a license agreement, essentially equivalent to monthly rental.

- Under a new type service, called custom contract services, IBM will "assume responsibility for performance of specified tasks, such as the design and installation of a data processing system." This move, essentially, could put IBM into competition with the facilities management companies currently in vogue.

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All of the price changes listed above are effective immediately for new orders and will become effective Jan. 1, 1970 for customers with computer systems currently installed or on order. Along with the announcement of this pricing separation, IBM also said that it is reducing the lease and purchase prices of its computer equipment by approximately three percent. This reduction is retroactive to June 16 for purchased equipment, and becomes effective Oct. 1 for customers with equipment on rental.

Some implications of unbundling

Until computer users start paying unbundled prices and competitive forces develop within the marketplace, the exact rules of the new game will not be known. As this happens during the next few months, EDP/IR will devote several issues to examining the effects of unbundling on various portions of the computer industry. At this time, however, there are some general observations which give a reasonable indication of what is to be expected:

- The actions taken by IBM represent a price increase of at least 5%, and this increase could well grow to 30% above current prices within a year.

- Unbundling marks a definite change in the revenue structure of the computer industry. In the future, the importance of hardware revenue will be lessened and there will be a compensating major shift of emphasis toward service revenue.

- In light of the first two items, IBM apparently has decided to continue to concentrate its efforts at achieving systematic growth in profits, even if these come from a smaller share of the marketplace. Thus, the growth rate in equipment deliveries could drop.

- The attention of the IBM salesman will be concentrated -- at least for the short term -- on software and systems engineering services. As a result of this, the salesman may for the first time gain a true insight into the application problems of his user.

- Because of the separate pricing schedules and the probable increased costs, the user will have a tremendous economic incentive to gain a firm grasp on his entire data processing costs.

- Early reports are that new products expected for System/360 will not be introduced until next year. This will definitely have the effect of teaching IBM salesmen to be "tigers" in the software market as they traditionally have been with hardware.

Every industry firm that has spoken out has expressed at least limited approval over IBM's new direction. In one sense, it would seem to us, IBM has broadened its umbrella to protect more of the computer industry than was previously the case. Also, although it is really too early to tell for sure, the initial reactions are that IBM's actions will lessen pressure from the companies that are sueing under antitrust laws, and perhaps set a pattern for the eventual agreement between IBM and the Justice Department. On these points, only time will tell. In the remainder of this issue of EDP/IR there is a full presentation of exactly what IBM has announced to date, some of the initial reactions, and our preliminary analysis. More will follow during the summer.



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The prices the users will pay

All the costs under IBM's new separate pricing are not known. For the record, however, some initial figures have been provided by the company:

- Systems engineers will be billed on the basis of the type of computer they are called on to work with. Basic systems service (the 1130, 360/20, etc.) will cost $66 for a "half-day," three-hour unit plus $22 per extra hour; general systems will be billed at $84 for the initial unit plus $28 per additional hour; and complex systems (360/65s and larger, plus the 1800 process computer) will run the user $105 plus $35 for each additional hour after the minimum period.

- More than 50 "professional-level" classroom courses will be offered for a charge, with courses announced before these new policies continuing to be free until the first of next year. IBM's charges for its professional courses will "vary widely according to content." A couple of examples offered by IBM are: "System/360 Operating System Advanced Coding," for $460 per student, and "System/360 Continuous System Modeling Program," for $170 per student.

- Program products, to use IBM's new terminology, will vary even more in price. These will be licensed for a designated central processing unit, and "the customer may use the same program on additional CPUs by paying for an additional license for each CPU." At present, monthly charges have been established for 18 programs; more will be added as time passes. The charges vary from $1500 a month for IBM's "Generalized Information System," down through $600 a month for its "Information Management System," to $125 for an "Order Allocation System" and $50 for "Medical Information System, Version II."

Reaction from the competition

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| Equipment (Manufacturing and Engineering + 1/2 Software Development) | 24.5 | 3 | 10.5 | 6 | 44 | 58.5 |
| Software (Customer Support-Software + 1/2 Software Development) | 5 | | 2 | 1.25 | 8.25 | 11 |
| Customer Support-Custom System Analysis | 4.5 | 1 | 2 | 1 | 8.5 | 11.5 |
| Customer Support-Education | 1 | | .5 | .25 | 1.75 | 2.5 |
| Maintenance | 10 | | | 2.5 | 12.5 | 16.5 |

THESE FIGURES ARE ESTIMATES PREPARED BY THE INTERNATIONAL DATA CORPORATION



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customer will buy at least 1/3 of the total amount he was getting previously. In that case, the simple dollars and cents point out that the customer's expenses for software, education, and systems engineering will start out at something like 6% to 10% above what he is now paying and probably will rise within the next year to the current level . . . giving essentially a cost increase of about 30% over what is being paid today.

It would seem to EDP/IR that the very large installations probably will have the least increase in costs, especially over the short term. The small and medium sized installations with their limited in-house resources will probably see their costs rising more rapidly. This is particularly probable in light of the fact that IBM -- for the next six months -- has given its salesmen a 10% commission on any systems engineering services that are sold.

The implication of this would appear to be that software marketing will become a real "dog-fight" situation, and perhaps that IBM will attempt to keep its income flow sustained by selling of SE services and software packages rather than pushing equipment already marketed for over five years. Around January 1, 1970, IBM is expected to announce a big package of equipment and to put into effect a new sales plan designed for unbundled selling.

New personnel requirements

Under unbundling, there will be several changes in the personnel requirements for operating computer centers, and there will probably be much more emphasis on personnel selection and training. For one thing, the "data processing manager" will soon have to become a new type of person. Previously, the DP Manager simply had to select the best vendor and then go about making sure he was delivered what was promised.

Very shortly, however, this job will be one of evaluating equipment, software, education, and other types of services, and could well challenge the DP Manager in many ways that were not required before. Add to this the fact that we will probably have a proliferation of software and support companies, and the personnel requirement rapidly is for the type person who even today is in very short supply. This might encourage the growth of so-called "facilities management" companies and/or benefit IBM's new custom contract services operation.

General effects on business

Indeed, facilities management companies -- or IBM with its custom contract services -- may well offer the only practical prospect for small and medium-scale users to have reasonable control over their computer costs. Some facilities management companies have voiced complaints about IBM's possible competition, but it seems to EDP/IR that the positive or umbrella effect of IBM's entry into the field will be more helpful than harmful to competitors.

Generally speaking, our current analysis indicates that IBM probably has made it easier -- or at least no harder -- for most companies in the computer industry to compete successfully. On the other hand, IBM doesn't seem to have done anything that will hurt its position, and it could well have made a move that will bring to it, and perhaps most other companies in the industry, more revenues, at least over the short term. And the user may have a chance to benefit. As IBM competes with other software suppliers, the added value of its products may well offset the increased costs to the user.



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Details of IBM's announcement

In its press release, IBM describes the history, rationale, and details of its pricing changes. This announcement, which EDP/IR considers significant, is reprinted below. We have underlined phrases of exceptional interest:

ARMONK, N.Y., June 23 . . . In keeping with its public statement made last December, International Business Machines Corporation announced today that certain systems engineering activities, most future computer programs, and most customer education courses, previously furnished without charge, will now be offered for a charge in the United States. Generally, these changes are effective immediately for new orders and will become effective January 1, 1970, for customers with machines installed or on order.

Coincident with this action, the company is reducing data processing equipment lease and purchase prices by approximately three percent. New purchase prices are effective for all equipment installed on or after June 16, 1969. New lease prices are effective October 1, 1969.

This price reduction reflects IBM's best approximation of those marketing expenses which will no longer be provided for in prices of currently announced equipment. This new method of doing business by the company's Data Processing Division does not represent a general price increase or decrease. The effect upon individual customers will vary. Many of IBM's customers will be able to take full advantage of the full amount of the equipment price decrease, while others will find their cost of data processing has increased, although their payments to IBM will not necessarily increase. IBM does not anticipate an increase in its revenues over the short term as a result of these actions.

IBM announced last December that a study had been underway which was expected to lead to changes by July 1, 1969, in the way the company charged for and supported its data processing equipment. This study was initiated prior to the filing of lawsuits against the company by the Department of Justice and several others, attacking the furnishing of programs, systems engineering and other services without charge. The extensive charges announced today have taken into account complaints and opinions from others in the industry and from the Government.

Because these changes represent such a significant departure from past practices, there will be a six-month transition period -- ending December 31, 1969 -- so that IBM and its customers can make the necessary adjustments to the new environment. During the transition period, customers with equipment installed or on order will continue to receive, without charge, data processing education, as well as systems engineering services to the extent such services have been mutually planned by IBM and the user.

The practice of furnishing customer support without charge dates back to the earliest days of the punched card industry. With the advent of the computer, IBM, in common with other computer manufacturers, carried on this practice and furnished systems engineering assistance, programs and education as a part of its marketing activities. Through this means, the company stated, computer manufacturers have been able to assure more effective use of new and complex machines by their customers. This approach also has facilitated the open interchange of programming concepts, which has been so vital to data processing users. The unprecedented expansion in the use of data processing equipment has been aided greatly by this support from manufacturers.



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Although predictions for the future in a field as young and volatile as the computer industry are hazardous, there are a number of indications that pricing of services ultimately will become an industry practice. These include:

1. Business opportunities for IBM and others, developing out of the growing need for increasingly complex and comprehensive systems support;

2. The increasing support requirements arising from the relocation and reapplication of a large number of systems owned by others;

3. A limited but increasing number of enterprises engaged in the development of computer programs for sale.

Highlights of today's announcement:

-- Systems engineering services, available for a charge, are provided to assist a customer in the installation and application of his IBM data processing system and to increase the customer's overall data processing proficiency. Services are offered in three skill classifications based on the complexity of the equipment and the way it is used in an operating environment. The services will be scheduled in half-day units.

-- Professional courses designed to assist users of IBM equipment in the education of their employees are offered for a charge. Course prices vary widely, depending on course content. Although IBM does not intend to solicit applications for its data processing education courses from the general public, it will accept applications from anyone meeting course prerequisites.

-- Program products, as distinct from system control programming, will be copyrighted and offered for a monthly charge under a license agreement. Program products contain logic directly related to the computer user's data and enable a system to accomplish a specific end result for the user. Each license will permit the customer to use a program product on a single designated central processing unit. Charges for program products will vary widely. System control programming is an essential part of a data processing system. It is fundamental to the operation and maintenance of the system and will be made available as part of the system. All programs currently available from IBM's program library continue to be in the public domain and available as in the past.

-- Custom contract services, a new offering, also was announced. Under a custom contract, IBM will assume responsibility for the performance of specified tasks in the areas of systems design and analysis, application and program development and systems installation and evaluation.

IBM's Field Engineering Division will continue to maintain both purchased and leased equipment in the same manner as in the past. As a result of today's changes, the Field Engineering Division also will assume a broader role in providing services for IBM programming. This includes responsibility for furnishing field services on all IBM-supported programming and responding to emergency calls on all other programming used on IBM systems.



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| | 1969 High | 1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 82 3/4 | 65 1/4 | 1068 | 80 1/2 | 76 | 79 1/4 | + 1 1/8 | + 1.44 |
| American R & D | 204 3/4 | 154 1/2 | 319 | 204 3/4 | 185 1/4 | 194 1/2 | + 1 | + 0.52 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 2195 | 43 7/8 | 40 | 41 7/8 | - 1 3/8 | - 3.18 |
| Bunker Ramo | 17 5/8 | 12 5/8 | 1974 | 14 1/8 | 13 | 13 | - 1/4 | - 1.88 |
| Burroughs | 135 1/8 | 121 1/2 | 1211 | 133 1/2 | 122 1/4 | 124 1/4 | - 7 1/8 | - 5.42 |
| Collins Radio | 69 3/4 | 48 | 1195 | 56 1/8 | 52 1/8 | 53 3/4 | - 2 1/8 | - 3.80 |
| Computer Sciences | 75 7/8 | 49 | 789 | 73 | 68 3/4 | 70 1/4 | + 1/4 | + 0.36 |
| Control Data | 159 1/4 | 125 1/8 | 1591 | 154 1/2 | 146 | 148 5/8 | - 4 3/4 | - 3.10 |
| Electronic Assoc. | 25 1/4 | 18 | 934 | 23 5/8 | 20 3/4 | 20 7/8 | - 1/2 | - 2.39 |
| General Electric | 98 1/4 | 85 1/8 | 2329 | 97 1/8 | 93 1/2 | 94 1/4 | - 2 1/2 | - 2.58 |
| Honeywell | 140 3/4 | 107 3/4 | 692 | 135 3/8 | 130 3/4 | 132 1/4 | + 1/4 | + 0.19 |
| IBM | 334 7/8 | 291 3/4 | 1415 | 329 | 318 1/4 | 319 | -11 1/2 | - 3.48 |
| ITT | 58 1/2 | 48 1/8 | 2714 | 56 | 53 | 54 1/2 | - 1/4 | - 0.46 |
| Leasco | 54 | 36 | 4780 | 40 1/4 | 36 3/8 | 36 5/8 | - 2 1/8 | - 5.48 |
| Litton | 74 1/2 | 48 1/4 | 2574 | 54 7/8 | 52 1/8 | 53 1/8 | - 1 3/4 | - 3.19 |
| Memorex | 89 3/4 | 65 | 514 | 88 1/2 | 84 5/8 | 86 | - 1 1/4 | - 1.43 |
| National Cash Register | 139 3/8 | 108 | 720 | 134 3/4 | 126 1/2 | 130 | - 4 1/4 | - 3.17 |
| RCA | 48 1/8 | 41 1/4 | 2663 | 47 3/8 | 44 1/2 | 44 | - 3 3/8 | - 7.12 |
| Raytheon | 50 1/4 | 36 5/8 | 844 | 38 7/8 | 36 5/8 | 37 7/8 | - 1/2 | - 1.30 |
| Sanders | 61 7/8 | 37 1/8 | 3232 | 46 1/2 | 37 1/8 | 37 1/8 | - 9 1/2 | -20.38 |
| SCM | 47 1/8 | 38 | 1460 | 44 1/4 | 40 3/4 | 41 3/8 | - 1 3/4 | - 4.06 |
| Singer | 84 1/4 | 71 3/4 | 1120 | 81 3/4 | 76 1/8 | 78 5/8 | - 3 | - 3.68 |
| Sperry Rand | 55 1/2 | 44 1/2 | 2400 | 53 7/8 | 50 3/4 | 52 1/8 | - 1 1/8 | - 2.11 |
| Teledyne | 45 1/2 | 36 1/8 | 2577 | 40 3/4 | 37 1/8 | 37 3/4 | - 2 1/4 | - 5.63 |
| Xerox | 275 7/8 | 241 | 1345 | 275 1/2 | 261 | 274 1/2 | + 1 5/8 | + 0.59 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 1.36 | - 3.13 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 83 1/4 | 63 1/4 | 96 | 82 7/8 | 79 1/2 | 81 7/8 | + 1/4 | + 0.31 |
| Calcomp | 37 1/2 | 27 | 502 | 33 1/4 | 31 1/8 | 31 7/8 | - 1 1/2 | - 4.71 |
| Clary Corp. | 25 3/4 | 17 | 382 | 19 1/2 | 17 | 17 7/8 | - 1 3/8 | - 7.14 |
| Computer Applications | 21 7/8 | 14 | 199 | 17 | 15 1/4 | 15 1/2 | - 1 1/2 | - 8.82 |
| Computing and Software | 56 3/8 | 37 | 467 | 54 | 48 | 51 | - 2 7/8 | - 5.34 |
| Data Proc. Fin. & Gen. | 60 1/4 | 31 5/8 | 1191 | 42 1/4 | 35 1/8 | 40 | + 3 7/8 | +10.73 |
| Data Products | 27 7/8 | 16 1/2 | 1349 | 18 1/2 | 16 5/8 | 17 | - 3/8 | - 2.26 |
| Digital Equipment | 205 | 138 1/2 | 196 | 205 | 179 | 198 | +13 | + 7.03 |
| Elect. Comp. Prog. In. | 38 1/4 | 21 5/8 | 203 | 28 1/2 | 21 5/8 | 22 1/4 | - 6 1/2 | -22.61 |
| Granite Computer | 45 1/2 | 26 | 419 | 35 3/4 | 32 3/8 | 32 3/8 | - 3 5/8 | -10.07 |
| Greyhound Computer | 28 5/8 | 19 | 220 | 20 5/8 | 19 1/4 | 19 1/4 | - 1 1/2 | - 7.23 |
| Levin-Townsend Comp. | 57 1/2 | 34 3/4 | 986 | 39 5/8 | 36 | 36 5/8 | - 2 3/8 | - 6.09 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 727 | 26 5/8 | 23 1/2 | 24 1/4 | - 1 7/8 | - 7.18 |
| Mohawk Data Sciences | 82 | 59 3/4 | 886 | 79 1/8 | 73 1/8 | 75 3/4 | - 3 3/4 | - 4.72 |
| Planning Research | 33 5/8 | 23 7/8 | 573 | 32 1/4 | 30 | 30 3/8 | - 1/4 | - 0.82 |
| Potter Instrument | 35 3/4 | 27 1/8 | 899 | 34 3/4 | 31 1/8 | 31 1/4 | - 1 3/8 | - 4.21 |
| Randolph Computers | 43 7/8 | 26 3/4 | 466 | 29 1/2 | 26 3/4 | 26 7/8 | - 2 1/2 | - 8.51 |
| Sys. Eng. Labs. | 36 | 26 1/8 | 541 | 35 1/4 | 31 1/2 | 35 1/4 | + 2 3/4 | + 7.24 |
| Telex | 37 5/8 | 20 3/4 | 1854 | 37 5/8 | 32 | 36 1/8 | + 2 1/2 | + 7.43 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 0.47 | - 3.52 |

| | 1969 High Bid | 1969 Low Bid | May 18, Bid | May 18, Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 39 1/2 | 31 | 39 1/2 | 41 1/2 | 34 | + 5 1/2 | +16.17 |
| Aries Corp. | 19 | 7 3/4 | 9 3/4 | 10 1/2 | 9 3/4 | -- | -- |
| Bolt, Beranek & Newman, Inc. | 19 | 14 1/2 | 15 | 16 | 15 | -- | -- |
| Computer Usage | 40 | 23 1/2 | 24 | 25 | 27 | - 3 | -11.11 |
| Cyber-tronics | 12 1/2 | 9 1/8 | 9 3/4 | 10 1/4 | 11 1/4 | - 1 1/2 | -13.33 |
| Digitronics | 22 1/2 | 15 | 15 1/2 | 16 1/2 | 17 | - 1 1/2 | - 8.82 |
| DPA, Inc. | 16 1/4 | 10 | 12 | 12 3/8 | 13 1/8 | - 1 1/8 | - 8.57 |
| Electronic Memories | 62 | 46 | 55 | 56 | 58 | - 3 | - 5.17 |
| Fabri-Tek | 12 7/8 | 10 | 10 3/4 | 11 1/4 | 11 1/4 | - 1/2 | - 4.44 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 29 | 29 3/4 | 28 | + 1 | + 3.57 |
| LMC Data, Inc. | 8 1/4 | 4 3/4 | 5 3/4 | 6 1/2 | 6 3/4 | - 1 | -14.81 |
| Management Assistance | 14 7/8 | 7 1/8 | 7 5/8 | 8 | 8 3/4 | - 1 1/8 | -12.83 |
| Optical Scanning Corp. | 118 | 54 | 58 | 61 | 60 | - 2 | - 3.33 |
| Recognition Equipment, Inc. | 76 | 54 | 63 | 64 | 67 | - 4 | - 5.97 |
| Tally Corp. | 36 | 22 | 24 | 26 | 25 1/2 | - 1 1/2 | - 5.88 |
| TBS Computer Centers Corp. | 36 | 11 | 30 | 32 | 36 | - 6 | -16.67 |
| University Computing | 155 | 68 | 72 | 74 | 77 | - 5 | - 6.49 |



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E|D|P industry report
AND MARKET REVIEW
• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 30,1969 • VOL.4,NO.21 P.J.McGOVERN,EDITOR

## UNBUNDLING BRIGHTENS SPOTLIGHT ON SOFTWARE CAPITALIZATION; RULING EXPECTED FROM IRS COULD UP TAX BILL FOR COMPUTER USERS

In the unbundled computer marketplace that is developing as IBM puts its separate pricing policies into operation (EDP/IR July 14,1969), the biggest question for today's computer user is how, and how much, he is going to pay for software. It is almost a certainty that current software budgets are going to be exceeded. In addition, the software marketplace will soon look different to both supplier and user, and accounting practices may have to be changed . . . at a price.

Most users are adopting a "wait-and-see" attitude. Because of this, many suppliers have been overly optimistic about their immediate prospects. EDP/IR's initial analysis of the situation indicates that independent software suppliers -- firms which probably could have anticipated a 40% to 50% market growth this year to the $400 million level -- now can look for this market to be some 25% greater, or approaching the $500 million level for 1969.

In spite of this opportunity for independents, the mainframe manufacturers will still supply the bulk of user software, while many users will study more carefully what's required to supply more of their own. In initial talks with computer customers, EDP/IR has discovered that by far the majority of them are strongly considering beefing up their own staff of systems analysts rather than paying the $22 to $35 an hour that IBM will charge for systems engineering time. Very simple arithmetic shows that, if the user can find qualified personnel, he is better off hiring his computer support team.

IBM, it is true, had benefited the independent software supplier by giving its blessing to separate pricing. However, what is often overlooked is that IBM is offering its programs only on a rental basis. This will tend to convert the software marketing business to a rental basis, requiring firms to be heavily capitalized before they can mount a major software development program . . . pushing the odds for success toward the bigger software houses and the mainframe manufacturers.

Indeed, even if IBM had not obtusely forced a shift toward a capitalized product environment, the same situation might not have been far away. The Internal Revenue Service presently is studying the feasibility of requiring that software development be capitalized, and such a requirement will have an effect not only on companies in the software industry, but also on hardware manufacturers and computer users.

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The amount of money involved here is significant; over the next few years, several billions of accelerated tax dollars could be required of computer users and software developers. Because of this, and because the timing of such a discussion is particularly appropriate, EDP/IR will devote a significant portion of this issue to an analysis of the financial differences between capitalizing and expensing software development costs.

The current situation

At present, the Internal Revenue Service allows companies to account for their software expenditures in just about any manner that is "consistent with accepted accounting principles"; there simply are no clear rules of any sort about accounting for software. Some rulings on the part of the New York District of the IRS indicate that guidelines are soon to be expected. If these new guidelines require capitalization of software, the independent software suppliers and a lot of computer users are in for a decision-making shake-up.

Today, almost all companies expense their software expenditures, at least for tax purposes. In other words, they treat the preparation, acquisition, or maintenance of software as an on-going expense -- much like computer rental -- and charge all software costs against current revenues when calculating profits for their tax returns.

Some companies, however -- especially the small independent software houses for which software costs are quite substantial relative to total revenues -- maintain two sets of books . . . one for income tax accounting purposes and one for financial reporting to stockholders. In these situations, software is expensed in the first case and is capitalized in the second.

Such practices, which are entirely legal, can and often do result in losses on the tax books and substantial profits on the other set. This is quite proper, the argument goes. Capitalized software is expected to generate revenues over several accounting periods, so the stockholders' books generally will give a better picture of the company's actual success.

The principal reason for such practices can be seen quite clearly in a company's balance sheet under the entry called "deferred income taxes." This represents the taxes that would have been charged against the earnings reported in the books but which were not paid because the tax books showed different earnings. These taxes will eventually be paid , but in the interim, the company can put the funds to profitable use while paying no interest on them.

Essentially, expensing is the ultimate form of fast tax write-off; it is the fastest way of accelerating depreciation. The faster the write-off, the more cash a company has to use, and the better it likes it. Even in large companies, where software expenditures are small relative to reported earnings, accountants are aware of the benefits of fast write-offs and will expense software development costs as long as they are allowed to. Thus, if the IRS begins to require that software be capitalized, almost every company that uses a computer or that participates in the computer industry will be hit with a higher tax bill . . . some, naturally, will feel this more than others.

What can be expected from IRS?

Obviously, the exact nature of any upcoming IRS ruling is uncertain. EDP/IR's



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research staff, however, has been able to construct a package that contains some of the more important and most likely features of any future ruling. One thing seem certain: Software will not be classified as a "tangible investment," and, therefore, it will not be eligible for either accelerated depreciation or for the 7% investment tax credit. Naturally, the physical facilities, buildings, desks, and other such equipment used by programmers would still be tangible, and could be written off under current guidelines.

Software, as we see it, will be defined very broadly and will include the wages of all employees engaged in software development. This would include programmers, systems analysts, keypunchers, computer operators, and anyone else involved. If an employee spends only a portion of his time on software projects, then that fraction of his salary will be included as a software cost. In addition, a "proportionate share" of the company's overhead will also be considered an entry in the software development account.

There probably will be provision for short-lived software -- one-shot programs, emergency maintenance, and the like -- to be expensed. Unfortunately, however, this will create a real problem area because it is extremely difficult to determine what portion of a company's software expenditure falls under the heading of "software creation" and therefore should be capitalized. Only constant surveillance and program-by-program inspection would accomplish this.

Trying to find a "reasonable" solution to this problem, the IRS presently is conducting a study in this area. To us, it seems there are only three possible alternatives: 1) continue the existing laissez faire policy on software; 2) allow computer users to police themselves; or 3) establish some very arbitrary set of rules for determining the fraction of software expenditures that should be capitalized. The latter seems most likely, if for no other reason than that it will bring the most money into the IRS.

In our study of current practices by software companies, we found that in their financial reports, most of these firms capitalize software development costs over either 3 or 5 years. We also consider it likely that the IRS will take the 3-year figure as the arbitrary, single depreciation period. Longer write-off periods might be allowed if a company could "justify" the use.

The cost of capitalization

Required capitalization will raise the cost of software development in two different ways:

- In the short run -- during the switch-over period -- people developing software will have to pay substantially higher taxes, and therefore, could have cash flow problems.

- In the long run, the cost of software development will be somewhat higher because of the financing cost.

To illustrate the first case, we will consider a company that has always expensed its software costs and is spending $300,000 a year for software that could be capitalized. With three-year, straight-line amortization of this investment, the firm could write off only $50,000 the first year (half the one-third chargeable against that year, since IRS considers an investment made during a year to be treated as if it were entirely made at mid-year); the second year, it could

charge $150,000 against its revenues; and the third, it could write off $250,000. In the fourth and subsequent years, assuming constant software expenditures, the company would be back to the position of writing off $300,000 per year.

During these three change-over years, the company would report $250,000, $150,000, and $50,000 more profit than it would if it were expensing its software. Thus, assuming a 50% tax rate, it would have to pay $225,000 more in taxes during the three-year period. This could put a real crimp in cash flow.

The other side of the coin -- the long-run cost increase -- is also easy to illustrate. This increase in software cost would arise from the financing costs necessary to fund the expenditure over several years. With the same three-year, straight-line depreciation, and further assuming a 15% internal corporate discount rate, we find that capitalized software will cost a company 4.5% more than it would if it were expensed.

A recent study by the International Data Corporation, publisher of EDP/IR, indicates that about 60% of all present-day software expenditures would be subject to capitalization under the conditions assumed above. Thus, this 4.5% rise in the cost of capitalizable software will mean, on average, an increase of about 3% for the average installation. This would, therefore, raise the total cost of a computer center's operations by 1% to 2%, depending on the ratio of software to hardware expenditures. In the light of the current inflation, this increase is not expected to have much effect on the use of computers.

To the U.S. Government, however, a switch to required software capitalization could have a very important short-term effect. EDP/IR estimates that about $7.5 billion will be spent this year for software. Using the 60% figure found in the study mentioned above, we can estimate that the capitalizable portion of this would be approximately $4.5 billion this year. If this portion were capitalized, $3.7 billion would be carried over as charges against future years, profits would rise by an equal amount, and computer users would pay an extra $1.85 billion in taxes!

These extra taxes, of course, will not continue forever. But IDC's study indicates that software expenditures will increase at least 50% over the next four years, and as long as software expenditures continue to grow, the accrued charges from past software expenditures will never catch up with current expenditures. Thus, corporate accounting profits and income taxes will continue to be higher than they would be if software were expensed.

## Individual effects of capitalization

Software capitalization would not effect all firms the same way. The type of firm that will be hit hardest will be the one in the software business or the one for which computer operations constitute a significant portion of total business. These companies may well feel a cash-flow squeeze over the short haul, although their long-run prospects won't be seriously affected by a new ruling. A few might actually be put out of business, but most companies with reasonable business prospects will be able to arrange for cash to tide them over. Their profits, of course, will decrease.

Two types of companies will hardly feel the effect of a new ruling by the IRS. The first group is composed of companies that -- for whatever reason -- have always capitalized their software expenditures. They will have to make

only minor accounting changes, at worst, upon issuance of rigid rules by the IRS. One example of such a company is Applied Data Research, one of the few software firms that has consistently capitalized its software. Its president, Richard Jones, is basically disinterested in the IRS study and even views the possible ruling as a boon to ADR, "because software users will take a more realistic look at their software costs and will look more favorably at software packages."

The second group of firms is composed of those which would not show profits in their tax books even if they did capitalize their software. These companies may want to capitalize their software so that they can carry their losses forward as many years as possible. Under present tax rules, companies can carry losses forward for five years and can deduct them from any profits realized during that period. If the firm cannot charge off all its losses within the five-year period, it loses whatever credits it has left. By capitalizing "expenses" such as software, a struggling firm can incur losses in the second and subsequent years that it otherwise would have incurred in the first year. These expenditures, then, can be deducted from profits earned in the sixth and subsequent years instead of being lost altogether.

In other words, capitalization is good for the company that does not expect to recoup the losses of its first year within the first five years. This type of company is probably quite rare, but some do exist and for them, software capitalization is a timely aid to tax loss utilization.

Prognosis

In the IDC study mentioned earlier, computer users said they expect to spend about 50% more on software by 1973 than they do at present. Also, they confirmed EDP/IR's projection (EDP/IR Mar.25,1969) that expenditures for independent software will increase from the $270 million spent in 1968 to the $1 billion range by 1973. This study was conducted prior to IBM's announcement of unbundling; subsequent interviews with respondents to the study reveal that most computer users now expect software costs to increase.

The very fact that unbundling will make the computer user more cognizant of his software costs means that the concept of software capitalization will be considered more carefully. As we have said before, the unbundled computer environment will force the evolution of a new type of data processing manager. One of the many new prerequisites for this job function will be a familiarity with accounting principles and tax regulations. When half or more of a company's computer operation may be capitalized, the DP manager may well want to consider taking this approach across the board . . . and buying his computers. Such a change in attitude could produce important changes in the computer industry as we know it.

Change is coming to the computer industry. The timing is right, and IBM's unbundling announcement put a definite timetable on the rate of change. The single greatest effect will be more user awareness; no longer are the majority of computer users going to be spoon-fed, as it were. If IRS forces software capitalization on the user, as well, he will mature even more rapidly than would have been otherwise expected. Also, of course, such a ruling could be an important ingredient in the Government's strategy for increasing tax revenues and dampening the current inflationary trend.

-- James Peacock, Managing Editor
-- Steven Pease, Associate Editor

# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in EDP/IR.

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF APRIL 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 18 | 2 | 20 | X |
| | 220 | $ 14,000 | 10/58 | 25 | 4 | 29 | X |
| | B100 | $ 2,800 | 8/64 | 91 | 14 | 105 | X |
| | B200 Series | $ 5,500 | 11/61 | 434 | 78 | 512 | X |
| | B300 Series | $ 9,500 | 7/65 | 464 | 101 | 565 | 45 |
| | B500 | $ 3,800 | 11/68 | 22 | 3 | 25 | 70 |
| | B2500 | $ 5,000 | 2/67 | 97 | 22 | 119 | 95 |
| | B3500 | $ 14,000 | 5/67 | 120 | 30 | 150 | 185 |
| | B5500 | $ 26,000 | 3/63 | 93 | 10 | 103 | 20 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 61 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 15 |
| | B8500 | $200,000 | 4/69 | 0 | 0 | 0 | 4 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 251 | 10 | 261 | X |
| | G-20 | $ 15,500 | 4/61 | 16 | 2 | 18 | X |
| | LGP-21 | $ 725 | 12/62 | 133 | 3 | 136 | X |
| | LGP-30 | $ 1,300 | 9/56 | 95 | 5 | 100 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 45 | 4 | 49 | X |
| | 160*/160A/160G | $2,100/$5,000/$12,000 | 5/60;7/61;3/64 | 449 | 37 | 486 | X |
| | 924/924A | $ 11,000 | 8/61 | 27 | 1 | 28 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 45 | 3 | 48 | X |
| | 1700 | $ 3,800 | 5/66 | 142 | 62 | 204 | 82 |
| | 3100/3150 | $ 10,500 | 12/64 | 108 | 23 | 131 | 16 |
| | 3200 | $ 14,000 | 5/64 | 42 | 15 | 57 | X |
| | 3300 | $ 28,000 | 9/65 | 117 | 30 | 147 | 17 |
| | 3400 | $ 19,000 | 11/64 | 14 | 4 | 18 | X |
| | 3500 | $ 25,000 | 1/69 | 4 | 0 | 4 | 22 |
| | 3600 | $ 52,000 | 6/63 | 30 | 11 | 41 | X |
| | 3800 | $ 53,000 | 2/66 | 17 | 3 | 20 | X |
| | 6400/6500 | $ 58,000 | 5/66 | 55 | 19 | 74 | 24 |
| | 6600 | $115,000 | 8/64 | 50 | 14 | 64 | 17 |
| | 7600 | $240,000 | 1/69 | 1 | 0 | 1 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 50 | 2 | 52 | X |
| | PDP-4 | $ 1,700 | 8/62 | 40 | 5 | 45 | X |
| | PDP-5 | $ 900 | 9/63 | 90 | 10 | 100 | X |
| | PDP-6 | $ 10,000 | 10/64 | 18 | 3 | 21 | X |
| | PDP-7 | $ 1,300 | 11/64 | 124 | 36 | 160 | X |
| | PDP-8 | $ 525 | 4/65 | 1173 | 255 | 1428 | 20 |
| | PDP-9/9L | $ 1,100 | 12/66 | 257 | 85 | 342 | 24 |
| | PDP-10 | $ 11,000 | 10/67 | 56 | 13 | 69 | 32 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 75 | 31 | 106 | 14 |
| | 8400 | $ 10,000 | 6/65 | 20 | 6 | 26 | 2 |
| EMR Computer | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 17 | 0 | 17 | 1 |
| | ADVNACE 6040 | $ 5,600 | 7/65 | 8 | 3 | 11 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 14 | 4 | 18 | 1 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 34 | 6 | 40 | 20 |
| General Electric | 105 | $ 1,350 | 7/69 | 0 | 0 | 0 | 170 |
| | 115 | $ 2,200 | 12/65 | 402 | 688 | 1090 | 145 |
| | 130 | $ 4,500 | 3/69 | 0 | 1 | 1 | 150 |
| | 205 | $ 2,900 | 6/64 | 11 | 0 | 11 | X |
| | 210 | $ 16,000 | 7/59 | 31 | 0 | 31 | X |
| | 215 | $ 6,000 | 9/63 | 19 | 2 | 21 | X |
| | 225 | $ 8,800 | 4/61 | 143 | 19 | 162 | X |
| | 235 | $ 12,500 | 4/64 | 119 | 25 | 144 | 8 |
| | 405 | $ 6,200 | 2/68 | 50 | 13 | 63 | 32 |
| | 415 | $ 11,000 | 5/64 | 323 | 92 | 415 | 24 |
| | 425 | $ 19,500 | 6/64 | 121 | 32 | 153 | 26 |
| | 435 | $ 27,000 | 9/65 | 34 | 8 | 42 | 11 |
| | 615 | $ 40,000 | 6/69 | 0 | 0 | 0 | 5 |
| | 625 | $ 54,000 | 4/65 | 27 | 4 | 31 | 7 |
| | 635 | $ 62,000 | 5/65 | 41 | 5 | 46 | 22 |
| | 645 | $ 90,000 | 7/66 | 9 | 0 | 9 | 1 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 106 | 34 | 140 | 50 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 45 | 20 | 65 | X |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 22 | 1 | 23 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 18 | 2 | 20 | X |
| Hewlett-Packard | 2000A | $ 2,500 | 11/68 | 6 | 0 | 6 | 63 |

AS OF APRIL 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 72 | 2 | 74 | X |
| | DDP-116 | $ 950 | 4/65 | 204 | 44 | 248 | 12 |
| | DDP-124 | $ 2,150 | 3/66 | 48 | 29 | 77 | 9 |
| | DDP-224 | $ 3,600 | 3/65 | 51 | 10 | 61 | 9 |
| | DDP-516 | $ 780 | 9/66 | 234 | 66 | 300 | 155 |
| | H-110 | $ 2,500 | 9/68 | 33 | 12 | 45 | 89 |
| | H-120 | $ 4,200 | 1/66 | 766 | 194 | 960 | 70 |
| | H-125 | $ 5,000 | 12/67 | 111 | 26 | 137 | 110 |
| | H-200 | $ 9,200 | 3/64 | 830 | 350 | 1180 | 70 |
| | H-400 | $ 8,500 | 12/61 | 50 | 38 | 88 | X |
| | H-632 | $ 3,500 | 12/68 | 6 | 0 | 6 | 40 |
| | H-800 | $ 30,000 | 12/60 | 58 | 14 | 72 | X |
| | H-1200 | $ 11,600 | 2/66 | 240 | 62 | 302 | 51 |
| | H-1250 | $ 12,000 | 8/68 | 29 | 8 | 37 | 83 |
| | H-1400 | $ 14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,500 | 1/66 | 129 | 29 | 158 | 69 |
| | H-3200 | $ 18,000 | 2/70 | 0 | 0 | 0 | 5 |
| | H-4200 | $ 20,500 | 9/68 | 5 | 0 | 5 | 21 |
| | H-8200 | $ 50,000 | 2/69 | 1 | 0 | 1 | 9 |
| IBM | 305 | $ 3,600 | 12/57 | 55 | 20 | 75 | X |
| | 360/20 | $ 2,800 | 12/65 | 6100 | 4050 | 10,150 | 2550 |
| | 360/25 | $ 5,330 | 10/68 | 480 | 120 | 600 | 3550 |
| | 360/30 | $ 8,800 | 5/65 | 6185 | 3515 | 9700 | 500 |
| | 360/40 | $ 16,800 | 4/65 | 2690 | 1105 | 3795 | 390 |
| | 360/44 | $ 15,000 | 7/66 | 273 | 57 | 330 | 57 |
| | 360/50 | $ 32,000 | 8/65 | 1085 | 245 | 1330 | 630 |
| | 360/65 | $ 60,000 | 11/65 | 514 | 103 | 617 | 262 |
| | 360/67 | $138,000 | 6/66 | 48 | 10 | 58 | 54 |
| | 360/75 | $ 81,400 | 1/66 | 37 | 8 | 45 | 9 |
| | 360/85 | $155,000 | 10/69 | 0 | 0 | 0 | 25 |
| | 360/90 Series | $150,000 | 11/67 | 13 | 0 | 13 | 6 |
| | 650 | $ 4,800 | 11/54 | 66 | 24 | 90 | X |
| | 1130 | $ 1,700 | 2/66 | 3220 | 1290 | 4510 | 1960 |
| | 1401 | $ 6,200 | 9/60 | 2815 | 1885 | 4700 | X |
| | 1401-G | $ 2,300 | 5/64 | 575 | 595 | 1170 | X |
| | 1401-H | $ 1,300 | 6/67 | 235 | 175 | 410 | X |
| | 1410 | $ 17,000 | 11/61 | 305 | 180 | 485 | X |
| | 1440 | $ 4,100 | 4/63 | 1645 | 1215 | 2860 | X |
| | 1460 | $ 9,800 | 10/63 | 586 | 109 | 695 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 836 | 459 | 1295 | X |
| | 1800 | $ 5,000 | 1/66 | 458 | 162 | 620 | 247 |
| | 7010 | $ 26,000 | 10/63 | 112 | 19 | 131 | X |
| | 702 | $ 6,900 | 2/55 | 3 | 0 | 3 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 15 | 2 | 17 | X |
| | 7040 | $ 25,000 | 6/63 | 65 | 44 | 109 | X |
| | 7044 | $ 36,500 | 6/63 | 63 | 22 | 85 | X |
| | 705 | $ 38,000 | 11/55 | 27 | 5 | 32 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 152 | 84 | 236 | X |
| | 7080 | $ 60,000 | 8/61 | 77 | 3 | 80 | X |
| | 709 | $ 40,000 | 8/58 | 2 | 0 | 2 | X |
| | 7090 | $ 63,500 | 11/59 | 28 | 6 | 34 | X |
| | 7094 I/II | $ 77,300 | 9/62;4/64 | 176 | 12 | 188 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 19 | 2 | 21 | X |
| | NCR-310 | $ 2,500 | 5/61 | 9 | 0 | 9 | X |
| | NCR-315 | $ 9,000 | 5/62 | 430 | 375 | 805 | 19 |
| | NCR-315-RMC | $ 12,500 | 9/65 | 99 | 24 | 123 | 15 |
| | NCR-390 | $ 1,950 | 5/61 | 825 | 405 | 1230 | X |
| | NCR-500 | $ 1,650 | 10/65 | 1785 | 815 | 2600 | 240 |
| | Century-100 | $ 2,645 | 9/68 | 99 | 11 | 110 | 790 |
| | Century-200 | $ 7,500 | 4/69 | 1 | 0 | 1 | 410 |
| Philco | 1000 | $ 7,010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210,211 | $ 40,000 | 10/58 | 12 | 1 | 13 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,500 | 2/61 | 392 | 204 | 596 | X |
| | RCA 3301 | $ 19,000 | 7/64 | 78 | 8 | 86 | X |
| | RCA 501 | $ 14,000 | 6/59 | 73 | 2 | 75 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,500 | 9/65 | 121 | 80 | 201 | 22 |
| | Spectra 70/25 | $ 7,200 | 9/65 | 77 | 41 | 118 | 22 |
| | Spectra 70/35 | $ 8,400 | 1/67 | 117 | 79 | 196 | 80 |
| | Spectra 70/45 | $ 24,000 | 11/65 | 232 | 79 | 311 | 48 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 4 | 0 | 4 | 9 |
| | Spectra 70/55 | $ 35,000 | 11/66 | 14 | 3 | 17 | 10 |
| | Spectra 70/60 | $ 38,000 | 9/70 | 0 | 0 | 0 | 4 |
| Raytheon | 250 | $ 1,200 | 12/60 | 113 | 44 | 157 | X |
| | 440 | $ 3,500 | 3/64 | 18 | 2 | 20 | X |
| | 520 | $ 3,200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp | 655 | $ 1,800 | 10/66 | 85 | 0 | 85 | 22 |
| | 660 | $ 2,000 | 10/65 | 37 | 3 | 40 | 22 |
| | 4700 | $ 800 | 4/69 | 2 | 0 | 2 | 52 |
| | 6700 | $ 16,000 | 11/69 | 0 | 0 | 0 | 1 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 63 | 5 | 68 | X |
| | SDS-910 | $ 2,000 | 8/62 | 173 | 15 | 188 | X |
| | SDS-920 | $ 2,900 | 9/62 | 139 | 20 | 159 | X |
| | SDS-925 | $ 3,000 | 12/64 | 23 | 2 | 25 | X |
| | SDS-930 | $ 3,400 | 6/64 | 144 | 20 | 164 | X |
| | SDS-940 | $ 25,000 | 4/66 | 45 | 4 | 49 | 15 |
| | SDS-9300 | $ 8,500 | 11/64 | 30 | 2 | 32 | X |
| | Sigma 2 | $ 1,800 | 12/66 | 160 | 30 | 190 | 130 |
| | Sigma 5 | $ 7,000 | 8/67 | 65 | 25 | 90 | 62 |
| | Sigma 7 | $ 13,500 | 12/66 | 51 | 13 | 64 | 19 |
| Standard Computer Corp | IC6000 | $ 18,000 | 5/67 | 15 | 0 | 15 | 9 |
| | IC4000 | $ 10,000 | 9/68 | 4 | 0 | 4 | 6 |
| Systems Eng. Labs. | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810 A/B | $900/$1,100 | 8/66;12/68 | 162 | 11 | 173 | 21 |
| | 840 | $ 1,400 | 11/65 | 3 | 0 | 3 | X |
| | 840 A/MP | $1,400/$1,600 | 8/66;10/67 | 53 | 0 | 53 | 14 |
| UNIVAC | I & II | $ 25,000 | 2/51 & 11/57 | 16 | 0 | 16 | X |
| | III | $ 21,000 | 8/62 | 70 | 13 | 83 | X |
| | File Computers | $ 15,000 | 8/56 | 8 | 0 | 8 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 99 | 68 | 167 | X |
| | 418 | $ 11,700 | 6/63 | 99 | 51 | 150 | 11 |
| | 490 Series | $ 32,000 | 12/61 | 180 | 26 | 206 | 21 |
| | 1004 | $ 1,900 | 2/63 | 1670 | 980 | 2650 | X |
| | 1005 | $ 2,550 | 4/66 | 950 | 430 | 1380 | 35 |
| | 1050 | $ 8,800 | 9/63 | 175 | 90 | 265 | X |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1106 | $ 37,000 | 2/70 | 0 | 0 | 0 | 7 |
| | 1107 | $ 57,000 | 10/62 | 19 | 8 | 27 | X |
| | 1108 | $ 68,000 | 9/65 | 137 | 51 | 188 | 110 |
| | 9200 | $ 1,600 | 6/67 | 313 | 99 | 412 | 520 |
| | 9300 | $ 3,600 | 9/67 | 172 | 58 | 230 | 420 |
| | 9400 | $ 7,000 | 5/69 | 0 | 0 | 0 | 125 |
| | LARC | $135,000 | 5/60 | 1 | 0 | 1 | X |
| | | | Total | 48,122 | 21,838 | 69,960 | 15,765 |

June 2, - June 13, 1969

| | 1969 High | 1969 Low | 2 Week Sales in 100's | 2 Week High | 2 Week Low | Last | 2 Week Net Change | 2 Week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 82 3/4 | 65 1/4 | 1038 | 79 3/4 | 70 3/4 | 70 3/4 | - 8 1/2 | -10.72 |
| American R & D | 204 3/4 | 154 1/2 | 262 | 200 3/4 | 182 1/2 | 189 | - 5 1/2 | - 2.83 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 1856 | 43 3/8 | 39 3/4 | 41 3/4 | - 1/8 | - 0.21 |
| Bunker Ramo | 17 5/8 | 11 3/4 | 1881 | 13 1/4 | 11 3/4 | 11 7/8 | - 1 1/8 | - 8.65 |
| Burroughs | 135 1/8 | 120 3/4 | 1593 | 129 7/8 | 120 3/4 | 125 1/4 | + 1 | + 0.80 |
| Collins Radio | 69 3/4 | 47 | 699 | 53 1/2 | 47 | 47 1/4 | - 6 1/2 | -12.09 |
| Computer Sciences | 75 7/8 | 49 | 1045 | 69 7/8 | 62 | 63 1/4 | - 6 1/2 | - 9.32 |
| Control Data | 159 1/4 | 125 1/8 | 2096 | 149 | 135 1/8 | 140 1/4 | - 8 3/8 | - 5.63 |
| Electronic Assoc. | 25 1/4 | 18 | 524 | 21 1/8 | 18 1/8 | 18 3/8 | - 2 1/2 | -11.97 |
| General Electric | 98 1/4 | 85 1/8 | 2318 | 94 | 89 1/2 | 91 1/2 | - 2 | - 2.14 |
| Honeywell | 140 3/4 | 107 3/4 | 1249 | 134 1/2 | 126 5/8 | 129 | - 5 1/2 | - 4.09 |
| IBM | 334 7/8 | 291 3/4 | 1766 | 321 1/2 | 307 3/4 | 311 1/2 | - 7 1/2 | - 2.35 |
| ITT | 58 1/2 | 48 1/8 | 3254 | 54 7/8 | 50 3/4 | 51 | - 3 1/2 | - 6.42 |
| Leasco | 54 | 33 1/4 | 4437 | 37 1/8 | 33 1/4 | 33 3/8 | - 3 1/4 | - 8.87 |
| Litton | 74 1/2 | 47 1/2 | 2678 | 53 1/4 | 47 1/2 | 48 1/2 | - 4 5/8 | - 8.71 |
| Memorex | 89 3/4 | 65 | 881 | 87 3/8 | 81 | 82 5/8 | - 3 3/8 | - 3.92 |
| National Cash Register | 139 5/8 | 108 | 855 | 130 1/2 | 124 1/2 | 125 | - 4 5/8 | - 3.57 |
| RCA | 48 1/8 | 41 1/4 | 3072 | 44 1/4 | 42 1/4 | 43 5/8 | - 1/8 | - 0.29 |
| Raytheon | 50 1/4 | 33 3/4 | 1071 | 38 3/4 | 33 3/4 | 33 3/4 | - 4 1/8 | -10.89 |
| Sanders | 61 7/8 | 32 1/2 | 2578 | 37 3/8 | 32 1/2 | 33 3/8 | - 3 3/4 | -10.10 |
| SCM | 47 1/8 | 36 | 2389 | 41 3/8 | 36 | 36 7/8 | - 4 1/2 | -10.88 |
| Singer | 84 1/4 | 71 3/4 | 1022 | 79 | 72 | 73 | - 5 5/8 | - 7.15 |
| Sperry Rand | 55 1/2 | 44 1/4 | 4395 | 53 3/8 | 48 1/2 | 49 1/2 | - 2 5/8 | - 5.05 |
| Teledyne | 45 1/2 | 31 1/2 | 3684 | 38 3/8 | 31 1/2 | 32 1/2 | - 5 1/4 | -13.91 |
| Xerox | 275 7/8 | 241 | 1965 | 274 | 255 | 260 | -14 1/2 | - 5.28 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 4.55 | - 6.57 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic D P | 83 1/4 | 63 1/4 | 230 | 82 7/8 | 73 3/8 | 74 3/4 | - 7 1/8 | - 8.70 |
| Calcomp | 37 1/2 | 27 | 220 | 32 1/2 | 30 1/8 | 30 5/8 | - 1 1/4 | - 3.92 |
| Clary Corp. | 25 3/4 | 16 1/4 | 831 | 19 7/8 | 16 1/4 | 16 7/8 | - 1 | - 5.59 |
| Computer Applications | 21 7/8 | 14 | 287 | 15 3/4 | 14 1/8 | 15 | - 1 | - 6.25 |
| Computing and Software | 56 3/8 | 37 | 411 | 51 1/4 | 45 3/8 | 45 5/8 | - 5 3/8 | -10.54 |
| Data Proc. Fin. & Gen. | 60 1/4 | 31 5/8 | 778 | 39 7/8 | 34 1/8 | 35 1/4 | - 4 3/4 | -11.88 |
| Data Products | 27 7/8 | 14 5/8 | 1558 | 17 1/4 | 14 5/8 | 15 | - 2 | -11.76 |
| Digital Equipment | 205 | 138 1/2 | 536 | 201 1/2 | 186 | 189 | - 9 | - 4.54 |
| Elect. Comp. Prog. In. | 38 1/4 | 20 5/8 | 265 | 28 7/8 | 20 5/8 | 25 1/4 | + 2 7/8 | +10.27 |
| Granite Computer | 45 1/2 | 26 | 258 | 33 | 28 | 28 1/2 | - 3 7/8 | -11.97 |
| Greyhound Computer | 28 5/8 | 16 1/4 | 312 | 19 | 16 1/4 | 16 3/4 | - 2 1/2 | -12.99 |
| Levin-Townsend Comp. | 57 1/2 | 32 1/4 | 1130 | 37 7/8 | 32 1/4 | 32 1/2 | - 4 1/8 | -11.26 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 984 | 29 1/8 | 22 1/4 | 25 3/4 | + 1 1/4 | + 5.10 |
| Mohawk Data Sciences | 82 | 59 3/4 | 1473 | 80 5/8 | 72 3/4 | 76 1/4 | + 1/2 | + 0.66 |
| Planning Research | 33 5/8 | 23 7/8 | 805 | 31 | 27 | 28 1/4 | - 2 1/8 | - 6.99 |
| Potter Instrument | 35 | 27 1/8 | 416 | 32 3/4 | 28 3/4 | 29 1/4 | - 2 | - 6.40 |
| Randolph Computers | 43 7/8 | 22 1/4 | 541 | 27 1/4 | 22 1/4 | 24 1/4 | - 2 5/8 | - 9.77 |
| Sys. Eng. Labs. | 36 | 26 1/8 | 857 | 35 5/8 | 30 1/8 | 30 3/8 | - 4 7/8 | -13.83 |
| Telex | 37 5/8 | 20 5/8 | 1151 | 36 7/8 | 31 1/8 | 32 3/8 | - 3 3/4 | -10.38 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 2.78 | - 6.88 |

| | 1969 High Bid | 1969 Low Bid | June 13, Bid | June 13, Asked | 2 Weeks Ago Bid | 2 Week Net Change Bid | 2 Week % Change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Applied Data Research, Inc. | 40 | 31 | 36 | 38 | 39 1/2 | - 3 1/2 | - 8.86 |
| Aries Corp. | 19 | 7 3/4 | 8 1/2 | 9 | 9 3/4 | - 1 1/4 | -12.82 |
| Bolt, Beranek & Newman, Inc. | 19 | 13 3/4 | 13 3/4 | 14 3/4 | 15 | - 1 1/4 | - 8.33 |
| Computer Usage | 40 | 17 | 17 | 18 | 24 | - 7 | -29.16 |
| Cyber-tronics | 12 1/2 | 8 | 8 | 8 3/4 | 9 3/4 | - 1 3/4 | -17.94 |
| Digitronics | 22 1/2 | 13 1/2 | 13 3/4 | 14 3/4 | 15 1/2 | - 1 3/4 | -11.29 |
| DPA, Inc. | 16 1/4 | 10 | 11 3/8 | 11 3/4 | 12 | - 5/8 | - 5.21 |
| Electronic Memories | 62 | 46 | 51 1/2 | 53 | 55 | - 3 1/2 | - 6.36 |
| Fabri-Tek | 12 7/8 | 9 3/8 | 9 3/8 | 9 7/8 | 10 3/4 | - 1 3/8 | -12.79 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 26 1/2 | 27 1/4 | 29 | - 2 1/2 | - 8.62 |
| LMC Data, Inc. | 8 1/4 | 4 3/4 | 5 1/2 | 6 1/4 | 5 3/4 | - 1/4 | - 4.35 |
| Management Assistance | 14 7/8 | 6 | 6 1/8 | 6 1/2 | 7 5/8 | - 1 1/2 | -19.67 |
| Optical Scanning Corp. | 118 | 54 | 54 | 56 | 58 | - 4 | - 6.89 |
| Recognition Equipment, Inc. | 76 | 54 | 57 | 58 | 63 | - 6 | - 9.52 |
| Tally Corp. | 36 | 21 | 21 | 23 | 24 | - 3 | -12.50 |
| TBS Computer Center Corp. | 36 | 11 | 25 1/2 | 27 1/2 | 30 | - 4 1/2 | -15.00 |
| University Computing | 155 | 68 | 68 | 70 | 72 | - 4 | - 5.55 |



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 6,1969 • VOL.4,NO.22 P.J.McGOVERN,EDITOR

## IBM's SYSTEM/3 IS NOT COMPATIBLE WITH EXISTING EQUIPMENT; IT APPEARS AIMED AT BUILDING A VASTLY BROADENED USER BASE

IBM has launched a program to bring computer usage to the "grass roots," with the introduction of the System/3, the "smaller business computer." While most of the rest of the industry watches, IBM is expected to add another 20,000 or so computer users to its customer base -- a major marketing coup, since most of them can be expected to remain IBM-computer users for years to come. Little wonder that IBM felt that the "3" justified calling its first major press conference since it unveiled the System/360 over five years ago.

System/3 is designed to get the small firm hooked on the computer habit, by making it easy and economical to get started. Its major market will be the 40,000 users of unit record equipment. Most of these firms have already automated their bookkeeping operations and are now being offered more sophistication and flexibility for a price comparable to what they are already paying. Only a third of these unit record users also have computers, so most of them will be getting their feet wet in computers with the System/3 -- and, at the same time, becoming more firmly entrenched in the IBM user base.

For reasons that we can guess at, IBM has made the System/3 virtually incompatible with existing IBM computers by using new input-output media and a new programming language, RPG II. Here are the "3's" major characteristics:

- The punched card used for input to the system -- about the same length as a credit card and half-an-inch wider -- allows a "multi-function card unit to handle more data faster than similar devices for other IBM systems." Each card can hold 96 characters, versus the traditional 80, and allows room for four 32-character printed lines.

- The system has no magnetic tape capability. One version is card oriented, with a 100 line-per-minute printer and the multi-function card unit; the other has up to four single disks of a different design from any that IBM now offers. Core storage starts at 8K for the card system and 12K for the disk system; it is expandable to 32K. Access time is a reasonably fast 1.5 microseconds.

- Sales and much programming assistance, at an unbundled price, will be handled by the more than 40 Basic Systems Centers (EDP/IR Mar. 12, 1969) across the country. Programming for System/3 is done in an English-like language based on System/360's RPG (report program generator). It is called RPG II, and is not compatible with RPG if any of the 20-odd new and more helpful instructions are used.

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- Application packages are offered on a do-it-yourself-kit basis. The "application customizer service" allows the customer to determine his job specifications by answering a series of questionnaires. From the questionnaires, IBM will generate flow charts, program descriptions and other helpful data, from which the customer's programmers can prepare the actual programs. Essentially, it's an ingenious way to sell programs to Systems 3 users, while IBM policy is to rent, but not sell software.

- The machine's circuitry is composed of what IBM calls its "new Monolithic Systems Technology (MST), which provides up to five circuits in a module" about 1/2-in. square. MST is actually something that might be described as three-and-a-half generation electronics, in much the same way as the circuitry for System/360 was primarily two-and-a-half generation electronics. It adequately reflects the price-performance state of the art.

- The rental price for the lowest priced model of System/3 is $945 a month, a "typical" disk version goes for $170 per month, and with more bells and whistles, a system can easily rent for well above $2000 a month, overlapping the lower range of the 360/20. Interestingly, the purchase-to-rental ratio for the System 3 averages only about 45-to-1, about where IBM priced its second-generation 1400-series equipment and significantly lower than the ratios established for the 360/25 and 360/85.

System/3 is clearly after a new market. It is being offered as the natural upgrade for users of the old unit record equipment, following the traditional upgrading strategy of allowing the user to become more and more sophisticated by taking small steps. The jump from unit record equipment to existing computers proved too large for many firms, so IBM has offered them a smaller first step. The only question is where do they go from System/3?

A new IBM strategy?

The announced capabilities and characteristics of System/3 raise a number of questions about IBM's marketing strategy. So far there is no link between the new product and System 360. There even seems to have been a conscious effort to make links between the two product lines as difficult as possible. The input-output media are incompatible and the programming language, RPG II, is not available on existing 360s. The internal machine code in the System/3 is the same as the 360s, so the two lines can theoretically intercommunicate directly.

The question seems to be whether IBM plans a separate product line for System/3 users, or whether it plans to provide the appropriate interface devices and use the new system as a funnel for getting smaller firms into the mainstream of the computer world. One idea is that the System/3 will be compatible only with IBM's new line of 360s, the so-called five series, but not with existing 360/20s and /30s. The fact that the top end of the System 3 overlaps the bottom end of the 360/20 gives some credence to this idea.

Another related question is whether or not IBM plans to offer a telecommunications capability for the System 3. It was widely expected that what is now called System 3 would be a terminal-oriented machine, in line with the idea that the future of small computers lies in telecommunications. Most observers still think IBM is going to offer telecommunications, but if so, their failure to do so from the start remains a puzzlement.



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System/3's market

IBM has announced that it expects to ship 26,000 to 28,000 System/3 units during the next three years. A recent International Data Corporation study shows that a far larger potential market exists and that IBM's estimates are more likely to be low than high. The table below shows some summary results of that study, giving the number of "tax-reporting units" in the United States, within non-government organizations, and the number of each units which have in-house computers. On the assumption that tax-reporting units over a certain critical size have bookkeeping and other jobs for which they could use a computer, if the price were right, the units over that critical size which do not presently have computers are all part of the System/3's potential market.

| Size of unit (# employees) | No. of units | # of units * with computers | % with computers | Comments |
|---|---|---|---|---|
| 0 - 19 | 3,011,934 | 829 | 0.03 | the plants use mostly manual methods |
| 20 - 99 | 314,773 | 3289 | 1.04 | small market for computers |
| 100 - 249 | 44,577 | 3154 | 7.08 | |
| 250 - 499 | 14,246 | 2637 | 18.51 | these plants |
| 500 - 999 | 6,111 | 2905 | 47.54 | comprise the major market for System/3 |
| 1000 - 2499 | 2,799 | 2513 | 89.78 | System/3 can find some use as data preparation and conversation system |
| 2500 -4999 | 714 | 714 | 100.00 | |
| 5000 + | 321 | 321 | 100.00 | |
| Total | 3,395,475 | 16,360 | 0.48 | |

* Source: International Data Corp. Computer Installation File - 1967

The figures are for March 1967, the latest date for which tax data are available. The table shows clearly the sharp decline of computer use as the size of the unit shrinks. What IBM hopes to do is to place one or more System/3 units in smaller plants which now have no computers. Using the above figures, if IBM could install one unit in every plant with 100 or more employees, it would have a market of over 56,000. Even allowing for the plants which have computerized since March 1967, IBM's potential market, in this area alone, is over 50,000.

The above analysis has neglected altogether the existence of a government market for the System/3, and more importantly, the existence of a foreign market which could easily prove to be larger than the domestic market. Foreign firms tend to be smaller than their American counterparts, so the number of small firms which will find a small computer attractive is probably quite large.

A few thoughts

System/3 is another demonstration of IBM's impressive ability to manuever within the industry and still maintain the "umbrella" under which the rest of the industry thrives. The other manufacturers of small and "mini" computers



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had feared the impact that IBM's small computer entry would have on their markets, but now they find that their markets have been left pretty much untouched. The "3" has found a market all its own and has left the other machines in its price range alone.

IBM has provided a large new market for independent peripheral suppliers that should become very active in the near future. Probably offerings by independent suppliers should include tape drives, card-to-tape converters, tape-to-punch devices and other devices that IBM has not yet offered. There is also speculation that independents may try and beat IBM to the punch with communications capabilities for the System/3.

It will be interesting to see what percentage of the System/3 units are purchased outright. Experience with the System 360 suggests that most computers are used far longer than the 50-odd months necessary to recoup the purchase price from rental payments. Since System/3 users are expected to commit it to "bread-and-butter" applications, such as payroll, accounting, etc., that will be necessary for as long as the user can plan, many may decide to purchase their "3" rather than pay the high premium for flexibility that IBM's long term rental customers pay.

## SYSTEMS DEVELOPMENT CORPORATION BECOMING "FOR-PROFIT" CORP.

It has been the fashion for the past year or so for small, privately-held software outfits to "go public." There are two main reasons for this; the desire of the firms' founders to realize the value that outside investors are willing to place on their firms, and the usefulness of stocks as an aquisition tool. Also, software firms have found that stock options are a good way or reducing their employees' willingness to migrate and the firm's vulnerability to the loss of irreplaceable personnel. Software firms that are not able to offer this kind of fringe-benefit often have a hard time compensating for this handicap and suffer employee desertions as a result.

For a long time, the Systems Development Corp., the largest software house of all, suffered from such a handicap. As a non-profit organization it had no stock to option, and as a result several groups of key men were lured away by enterpreneurs starting up new software houses. SDC provided men for EDP Technology last year and for a new software venture backed by King Resources earlier this summer. Individual SDC veterans have also been going into time-sharing, or have joined other software houses, including rival Planning Research Corp.

In an effort to combat this, SDC is "going public," SDC, with fiscal 1969 revenues over $60 million , has a staff of 3200, over two thirds of which are programmers and systems analysts. (Computer Sciences Corp., now the top-ranking publically-held software house had revenues of $65 million in 1968, but only a third or so of this came from programming efforts.) SDC was an outgrowth of another "think-tank", the Rand Corp., and has performed such complex tasks as the design and implementation of the Sage air defense network. The vast majority of SDC billings are military contracts ($50 million), about $10 million from systems work for other federal, state and local governments, and $1-$2 million in commercial jobs.

SDC has been a non-profit trust which is now transferring its operations to a new, for-profit corporation. The trust, which will be renamed the Systems Development Foundation, will sell about 25% of SDC's stock to an investment group headed by Lehman Bros., which will also have an option on another 20%. About 20% of the



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equity will be held for employee stock participation, and the Foundation will retain 55%. Shares will be offered to the public in about eighteen months or two years, according to SDC President Wesley S. Melahn. He adds, "We want to get a track record before going public"

SDC's financial record to-date isn't much of a guide. Net income has been less than 1% of sales largely because of a huge internally financed research program which might not be undertaken when the firms becomes profit-oriented. This research program has cost close to $2 million a year recently, or between three and four times reported net income. From now on, though, the pressure will be on to show profits. The investors will naturally want something to show for their money, and the Foundation has plans for sponsoring computer research at universities and other institutions, which it hopes to finance by selling its stock holdings slowly, much like the Ford Foundation.

SDC's record in technical achievement is already formidable, with many firsts in time-sharing, large-systems management and design, and in computer languages. SDC has only been seeking commercial business for about two years, and half of its commercial billings to-date have come from time-sharing operations on the firms's two 360/67s, operating under SDC's own software. SDC's roughly thirty commercial customers include such firms as; Atlantic-Richfield, Transamerica Corp., Bendix, Dun & Bradstreet, and Western Union.

Some competitors have pooh-poohed SDC's entry into the commercial world, noting that it has a very fledgling marketing staff and tends to approach business with the attitude of a regulation-bound government contractor. One competitor, however, gripes that the giant software house has an unfair advantage, since "the Air Force put them into business."

Melahn expects SDC to make it in the business world, despite its late start and its marketing weaknesses , because of its talents in working with large systems. "We are latecomers to the commercial area," he says. "We are putting a lot of effort into expanding sales and specialty software, especially for large commercial customers. It takes the same type of talents as used for large military and public systems."

EDP/IR is watching SDC with some interest, precisely because it is the largest software firm around. It has, as yet, made little impact in the commercial market, and it has not yet proven that it can. Still the shere size of the firm makes it a firm to watch. The unbundled software market is going to be a place of great opportunity for software houses with the resources to take advantage of it. EDP/IR feels that big software firms are going to take over the lion's share of the business and the only question now is who the big firms are going to be.

## ARTHUR D. LITTLE GOING PUBLIC

Wall Street is awaiting the public offering of stock of another think tank, Arthur D. Little, Inc. ADL's employee trust plans to sell a third interest in the prestigious Cambridge, Mass. consultant firm, for much the same reasons as SDC--stock options as employee incentives. ADL earned $1.3 million in 1968 on revenues of $38.6 million, a return of 3.4% on sales. While ADL has built revenues from $26.8 million in 1964, income has stayed at about the 3.5%-4.5% of sales level. Lately, ADL has found it difficult to hold good personnel, although their staff covers many scientific fields besides computers.



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in EDP/IR.

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF MAY 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 17 | 2 | 19 | X |
| | 220 | $ 14,000 | 10/58 | 24 | 4 | 28 | X |
| | B100 | $ 2,800 | 8/64 | 85 | 12 | 97 | X |
| | B200 Series | $ 5,500 | 11/61 | 428 | 77 | 505 | X |
| | B300 Series | $ 9,500 | 7/65 | 467 | 102 | 569 | 41 |
| | B500 | $ 3,800 | 11/68 | 27 | 3 | 30 | 65 |
| | B2500 | $ 5,000 | 2/67 | 103 | 24 | 127 | 90 |
| | B3500 | $ 14,000 | 5/67 | 128 | 33 | 161 | 176 |
| | B5500 | $ 26,000 | 3/63 | 95 | 10 | 105 | 18 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 61 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 15 |
| | B8500 | $200,000 | 4/69 | 1 | 0 | 1 | 4 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 247 | 10 | 257 | X |
| | G-20 | $ 15,500 | 4/61 | 15 | 2 | 17 | X |
| | LGP-21 | $ 725 | 12/62 | 129 | 3 | 132 | X |
| | LGP-30 | $ 1,300 | 9/56 | 92 | 5 | 97 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 44 | 4 | 48 | X |
| | 160*/160A/160G | $2,100/$5,000/$12,000 | 5/60;7/61;3/64 | 447 | 37 | 484 | X |
| | 924/924A | $ 11,000 | 8/61 | 26 | 1 | 27 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 44 | 3 | 47 | X |
| | 1700 | $ 3,800 | 5/66 | 144 | 63 | 207 | 78 |
| | 3100/3150 | $ 10,500 | 12/64 | 109 | 23 | 132 | 14 |
| | 3200 | $ 14,000 | 5/64 | 42 | 15 | 57 | X |
| | 3300 | $ 28,000 | 9/65 | 118 | 31 | 149 | 15 |
| | 3400 | $ 19,000 | 11/64 | 14 | 4 | 18 | X |
| | 3500 | $ 25,000 | 1/69 | 5 | 0 | 5 | 21 |
| | 3600 | $ 52,000 | 6/63 | 30 | 11 | 41 | X |
| | 3800 | $ 53,000 | 2/66 | 17 | 3 | 20 | X |
| | 6400/6500 | $ 58,000 | 5/66 | 56 | 20 | 76 | 24 |
| | 6600 | $115,000 | 8/64 | 52 | 15 | 67 | 16 |
| | 7600 | $240,000 | 1/69 | 1 | 0 | 1 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 50 | 2 | 52 | X |
| | PDP-4 | $ 1,700 | 8/62 | 40 | 5 | 45 | X |
| | PDP-5 | $ 900 | 9/63 | 90 | 10 | 100 | X |
| | PDP-6 | $ 10,000 | 10/64 | 18 | 3 | 21 | X |
| | PDP-7 | $ 1,300 | 11/64 | 124 | 36 | 160 | X |
| | PDP-8 | $ 525 | 4/65 | 1182 | 255 | 1437 | 18 |
| | PDP-9/9L | $ 1,100 | 12/66 | 263 | 87 | 350 | 23 |
| | PDP-10 | $ 11,000 | 10/67 | 58 | 14 | 72 | 32 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 76 | 32 | 108 | 12 |
| | 8400 | $ 10,000 | 6/65 | 20 | 6 | 26 | 2 |
| EMR Computer | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 17 | 0 | 17 | 1 |
| | ADVNACE 6040 | $ 5,600 | 7/65 | 8 | 3 | 11 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 14 | 4 | 18 | 1 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 36 | 7 | 43 | 18 |
| General Electric | 105 | $ 1,350 | 7/69 | 0 | 0 | 0 | 175 |
| | 115 | $ 2,200 | 12/65 | 407 | 708 | 1115 | 120 |
| | 130 | $ 4,500 | 3/69 | 1 | 3 | 4 | 150 |
| | 205 | $ 2,900 | 6/64 | 11 | 0 | 11 | X |
| | 210 | $ 16,000 | 7/59 | 30 | 0 | 30 | X |
| | 215 | $ 6,000 | 9/63 | 19 | 2 | 21 | X |
| | 225 | $ 8,800 | 4/61 | 142 | 19 | 161 | X |
| | 235 | $ 12,500 | 4/64 | 120 | 25 | 145 | 6 |
| | 405 | $ 6,200 | 2/68 | 53 | 13 | 66 | 30 |
| | 415 | $ 11,000 | 5/64 | 325 | 93 | 418 | 22 |
| | 425 | $ 19,500 | 6/64 | 123 | 32 | 155 | 24 |
| | 435 | $ 27,000 | 9/65 | 34 | 8 | 42 | 10 |
| | 615 | $ 40,000 | 6/69 | 0 | 0 | 0 | 5 |
| | 625 | $ 54,000 | 4/65 | 26 | 4 | 30 | 6 |
| | 635 | $ 62,000 | 5/65 | 41 | 5 | 46 | 20 |
| | 645 | $ 90,000 | 7/66 | 9 | 0 | 9 | 0 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 113 | 36 | 149 | 45 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 45 | 20 | 65 | X |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 21 | 1 | 22 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 18 | 2 | 20 | X |
| Hewlett-Packard | 2000A | $ 2,500 | 11/68 | 8 | 0 | 8 | 61 |



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|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 71 | 2 | 73 | X |
| | DDP-116 | $ 950 | 4/65 | 205 | 44 | 249 | 11 |
| | DDP-124 | $ 2,150 | 3/66 | 49 | 30 | 79 | 8 |
| | DDP-224 | $ 3,600 | 3/65 | 52 | 10 | 62 | 8 |
| | DDP-516 | $ 780 | 9/66 | 242 | 68 | 310 | 150 |
| | H-110 | $ 2,500 | 9/68 | 36 | 14 | 50 | 87 |
| | H-120 | $ 4,200 | 1/66 | 762 | 193 | 955 | 65 |
| | H-125 | $ 5,000 | 12/67 | 122 | 30 | 152 | 110 |
| | H-200 | $ 9,200 | 3/64 | 832 | 350 | 1182 | 65 |
| | H-400 | $ 8,500 | 12/61 | 49 | 38 | 87 | X |
| | H-632 | $ 3,500 | 12/68 | 9 | 0 | 9 | 38 |
| | H-800 | $ 30,000 | 12/60 | 58 | 14 | 72 | X |
| | H-1200 | $ 11,600 | 2/66 | 243 | 63 | 306 | 46 |
| | H-1250 | $ 12,000 | 8/68 | 32 | 10 | 42 | 85 |
| | H-1400 | $ 14,000 | 1/64 | 8 | 2 | 10 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,500 | 1/66 | 131 | 30 | 161 | 68 |
| | H-3200 | $ 18,000 | 2/70 | 0 | 0 | 0 | 8 |
| | H-4200 | $ 20,500 | 9/68 | 7 | 0 | 7 | 19 |
| | H-8200 | $ 50,000 | 2/69 | 2 | 0 | 2 | 9 |
| IBM | 305 | $ 3,600 | 12/57 | 52 | 20 | 72 | X |
| | 360/20 | $ 2,800 | 12/65 | 6200 | 4100 | 10,300 | 2500 |
| | 360/25 | $ 5,330 | 10/68 | 640 | 160 | 800 | 3500 |
| | 360/30 | $ 8,800 | 5/65 | 6255 | 3545 | 9800 | 480 |
| | 360/40 | $ 16,800 | 4/65 | 2740 | 1125 | 3865 | 350 |
| | 360/44 | $ 15,000 | 7/66 | 277 | 58 | 335 | 53 |
| | 360/50 | $ 32,000 | 8/65 | 1110 | 250 | 1360 | 620 |
| | 360/65 | $ 60,000 | 11/65 | 524 | 105 | 629 | 259 |
| | 360/67 | $138,000 | 6/66 | 51 | 11 | 62 | 54 |
| | 360/75 | $ 81,400 | 1/66 | 38 | 8 | 46 | 9 |
| | 360/85 | $155,000 | 10/69 | 0 | 0 | 0 | 28 |
| | 360/90 Series | $150,000 | 11/67 | 15 | 0 | 15 | 4 |
| | 650 | $ 4,800 | 11/54 | 63 | 23 | 86 | X |
| | 1130 | $ 1,700 | 2/66 | 3235 | 1295 | 4530 | 1940 |
| | 1401 | $ 6,200 | 9/60 | 2755 | 1845 | 4600 | X |
| | 1401-G | $ 2,300 | 5/64 | 560 | 580 | 1140 | X |
| | 1401-H | $ 1,300 | 6/67 | 230 | 170 | 400 | X |
| | 1410 | $ 17,000 | 11/61 | 295 | 175 | 470 | X |
| | 1440 | $ 4,100 | 4/63 | 1630 | 1200 | 2830 | X |
| | 1460 | $ 9,800 | 10/63 | 575 | 105 | 680 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 823 | 452 | 1275 | X |
| | 1800 | $ 5,000 | 1/66 | 465 | 165 | 630 | 243 |
| | 7010 | $ 26,000 | 10/63 | 105 | 18 | 123 | X |
| | 702 | $ 6,900 | 2/55 | 3 | 0 | 3 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 15 | 2 | 17 | X |
| | 7040 | $ 25,000 | 6/63 | 64 | 43 | 107 | X |
| | 7044 | $ 36,500 | 6/63 | 62 | 22 | 84 | X |
| | 705 | $ 38,000 | 11/55 | 27 | 5 | 32 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 150 | 83 | 233 | X |
| | 7080 | $ 60,000 | 8/61 | 76 | 3 | 79 | X |
| | 709 | $ 40,000 | 8/58 | 2 | 0 | 2 | X |
| | 7090 | $ 63,500 | 11/59 | 27 | 6 | 33 | X |
| | 7094 I/II | $ 77,300 | 9/62;4/64 | 174 | 11 | 185 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 19 | 2 | 21 | X |
| | NCR-310 | $ 2,500 | 5/61 | 9 | 0 | 9 | X |
| | NCR-315 | $ 9,000 | 5/62 | 428 | 374 | 802 | 18 |
| | NCR-315-RMC | $ 12,500 | 9/65 | 101 | 25 | 126 | 14 |
| | NCR-390 | $ 1,950 | 5/61 | 685 | 345 | 1030 | X |
| | NCR-500 | $ 1,650 | 10/65 | 1840 | 835 | 2675 | 220 |
| | Century-100 | $ 2,645 | 9/68 | 106 | 12 | 118 | 782 |
| | Century-200 | $ 7,500 | 4/69 | 8 | 0 | 8 | 400 |
| Philco | 1000 | $ 7,010 | 6/63 | 14 | 1 | 15 | X |
| | 2000-210,211 | $ 40,000 | 10/58 | 12 | 1 | 13 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,500 | 2/61 | 389 | 203 | 592 | X |
| | RCA 3301 | $ 19,000 | 7/64 | 78 | 8 | 86 | X |
| | RCA 501 | $ 14,000 | 6/59 | 72 | 2 | 74 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,500 | 9/65 | 123 | 81 | 204 | 19 |
| | Spectra 70/25 | $ 7,200 | 9/65 | 79 | 42 | 121 | 17 |
| | Spectra 70/35 | $ 8,400 | 1/67 | 120 | 81 | 201 | 79 |
| | Spectra 70/45 | $ 24,000 | 11/65 | 236 | 81 | 317 | 46 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 5 | 0 | 5 | 9 |
| | Spectra 70/55 | $ 35,000 | 11/66 | 15 | 3 | 18 | 11 |
| | Spectra 70/60 | $ 38,000 | 9/70 | 0 | 0 | 0 | 5 |
| Raytheon | 250 | $ 1,200 | 12/60 | 111 | 44 | 155 | X |
| | 440 | $ 3,500 | 3/64 | 17 | 2 | 19 | X |
| | 520 | $ 3,200 | 10/65 | 23 | 3 | 26 | X |
| Scientific Control Corp | 655 | $ 1,800 | 10/66 | 90 | 0 | 90 | 18 |
| | 660 | $ 2,000 | 10/65 | 60 | 5 | 65 | 32 |
| | 4700 | $ 800 | 4/69 | 4 | 0 | 4 | 67 |
| | 6700 | $ 16,000 | 11/69 | 0 | 0 | 0 | 2 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 62 | 5 | 67 | X |
| | SDS-910 | $ 2,000 | 8/62 | 171 | 15 | 186 | X |
| | SDS-920 | $ 2,900 | 9/62 | 138 | 20 | 158 | X |
| | SDS-925 | $ 3,000 | 12/64 | 22 | 2 | 24 | X |
| | SDS-930 | $ 3,400 | 6/64 | 143 | 20 | 163 | X |
| | SDS-940 | $ 25,000 | 4/66 | 47 | 4 | 51 | 17 |
| | SDS-9300 | $ 8,500 | 11/64 | 30 | 2 | 32 | X |
| | Sigma 2 | $ 1,800 | 12/66 | 172 | 33 | 205 | 120 |
| | Sigma 5 | $ 7,000 | 8/67 | 72 | 28 | 100 | 60 |
| | Sigma 7 | $ 13,500 | 12/66 | 55 | 15 | 70 | 19 |
| Standard Computer Corp | IC6000 | $ 18,000 | 5/67 | 15 | 0 | 15 | 7 |
| | IC4000 | $ 10,000 | 9/68 | 5 | 0 | 5 | 6 |
| Systems Eng. Labs. | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810 A/B | $900/$1,100 | 8/66;12/68 | 164 | 11 | 175 | 16 |
| | 840 | $ 1,400 | 11/65 | 3 | 0 | 3 | X |
| | 840 A/MP | $1,400/$1,600 | 8/66;10/67 | 55 | 0 | 55 | 11 |
| UNIVAC | I & II | $ 25,000 | 2/51 & 11/57 | 16 | 0 | 16 | X |
| | III | $ 21,000 | 8/62 | 70 | 13 | 83 | X |
| | File Computers | $ 15,000 | 8/56 | 8 | 0 | 8 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 97 | 67 | 164 | X |
| | 418 | $ 11,700 | 6/63 | 99 | 51 | 150 | 10 |
| | 490 Series | $ 32,000 | 12/61 | 182 | 26 | 208 | 19 |
| | 1004 | $ 1,900 | 2/63 | 1650 | 970 | 2620 | X |
| | 1005 | $ 2,550 | 4/66 | 960 | 435 | 1395 | 30 |
| | 1050 | $ 8,800 | 9/63 | 174 | 90 | 264 | X |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1106 | $ 37,000 | 2/70 | 0 | 0 | 0 | 10 |
| | 1107 | $ 57,000 | 10/62 | 19 | 8 | 27 | X |
| | 1108 | $ 68,000 | 9/65 | 142 | 53 | 195 | 109 |
| | 9200 | $ 1,600 | 6/67 | 321 | 103 | 424 | 500 |
| | 9300 | $ 3,600 | 9/67 | 180 | 62 | 242 | 405 |
| | 9400 | $ 7,000 | 5/69 | 0 | 0 | 0 | 125 |
| | LARC | $135,000 | 5/60 | 1 | 0 | 1 | X |
| | | | Totals | 48,500 | 22,628 | 71,128 | 15,448 |



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June 16, - June 27, 1969

| | 1969 High | 1969 Low | 2 week Sales in 100's | 2 week High | 2 week Low | Last | 2 week Net Change | 2 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 82 3/4 | 65 1/4 | 1053 | 76 | 70 | 74 1/4 | + 3 1/2 | + 4.95 |
| American R & D | 204 3/4 | 154 1/2 | 342 | 197 3/4 | 183 | 197 1/4 | + 8 1/4 | + 4.37 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 2693 | 42 3/4 | 37 1/2 | 42 1/8 | + 3/8 | + 0.90 |
| Bunker Ramo | 17 5/8 | 10 1/2 | 1650 | 12 1/8 | 10 1/2 | 11 1/8 | - 3/4 | - 6.32 |
| Burroughs | 140 | 120 3/4 | 2224 | 140 | 122 1/2 | 137 | +12 | + 9.60 |
| Collins Radio | 69 3/4 | 44 | 535 | 48 1/4 | 44 | 44 3/4 | - 2 1/4 | - 4.79 |
| Computer Sciences | 75 7/8 | 49 | 2031 | 66 1/4 | 61 | 63 5/8 | + 3 7/8 | + 6.32 |
| Control Data | 159 1/4 | 125 1/8 | 3956 | 149 7/8 | 139 1/2 | 149 | + 8 3/4 | + 6.24 |
| Electronic Assoc. | 25 1/4 | 16 7/8 | 375 | 19 1/4 | 16 7/8 | 17 5/8 | - 3/4 | - 4.08 |
| General Electric | 98 1/4 | 85 1/8 | 3679 | 92 3/4 | 88 3/8 | 90 3/4 | - 3/4 | - 0.82 |
| Honeywell | 140 3/4 | 107 3/4 | 1564 | 132 | 124 3/4 | 128 1/4 | - 3/4 | - 0.58 |
| IBM | 334 7/8 | 291 3/4 | 2805 | 334 1/2 | 310 1/4 | 331 1/2 | +20 | + 6.42 |
| ITT | 58 1/2 | 48 1/8 | 3913 | 51 3/8 | 49 | 49 5/8 | - 1 3/8 | - 2.70 |
| Leasco | 54 | 28 1/4 | 3710 | 34 1/8 | 28 1/4 | 30 3/4 | - 2 5/8 | - 7.87 |
| Litton | 74 1/2 | 45 1/2 | 2843 | 49 5/8 | 45 1/2 | 47 3/8 | - 1 1/8 | - 2.31 |
| Memorex | 89 3/4 | 65 | 1819 | 82 3/4 | 75 3/4 | 82 | - 5/8 | - 0.76 |
| National Cash Register | 139 3/8 | 108 | 1934 | 128 1/4 | 116 1/4 | 125 3/4 | + 3/4 | + 0.60 |
| RCA | 48 1/8 | 40 3/8 | 3626 | 44 3/4 | 40 3/8 | 41 1/8 | - 2 1/2 | - 5.73 |
| Raytheon | 50 1/4 | 30 5/8 | 3340 | 34 1/2 | 30 5/8 | 33 3/8 | - 3/8 | - 1.11 |
| Sanders | 61 7/8 | 28 | 1718 | 33 1/8 | 28 | 29 1/2 | - 3 7/8 | -11.61 |
| SCM | 47 1/8 | 33 3/4 | 1554 | 37 5/8 | 33 3/4 | 35 1/2 | - 1 1/8 | - 3.07 |
| Singer | 84 1/4 | 71 1/2 | 761 | 75 1/4 | 71 1/2 | 71 1/2 | - 1 1/2 | - 2.05 |
| Sperry Rand | 55 1/2 | 44 1/4 | 6649 | 54 7/8 | 49 1/2 | 53 5/8 | + 4 1/4 | + 8.61 |
| Teledyne | 45 1/2 | 29 | 5409 | 33 1/4 | 29 | 30 1/2 | - 2 | - 6.15 |
| Xerox | 100 1/2 | 85 1/4 | 8060 | 100 1/2 | 85 1/4 | 98 3/4 | +11 3/8 | +13.02 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 2.03 | + 0.04 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Automatic DP | 83 1/4 | 63 1/4 | 376 | 78 | 71 1/2 | 74 1/8 | - 5/8 | - 0.84 |
| Calcomp | 37 1/2 | 25 1/4 | 481 | 30 3/8 | 25 1/4 | 27 7/8 | - 2 3/4 | - 8.97 |
| Clary Corp. | 26 3/4 | 13 5/8 | 369 | 17 1/4 | 13 5/8 | 14 5/8 | - 2 1/4 | -13.33 |
| Computer Applications | 21 7/8 | 13 1/2 | 199 | 14 7/8 | 13 1/2 | 13 3/4 | - 3/4 | - 5.17 |
| Computing and Software | 56 3/8 | 37 | 405 | 48 1/2 | 42 | 48 | + 2 3/8 | + 5.20 |
| Data Proc. Fin. & Gen. | 60 1/4 | 31 5/8 | 992 | 35 1/2 | 32 1/4 | 34 1/2 | - 3/4 | - 2.13 |
| Data Products | 27 7/8 | 13 1/2 | 1216 | 15 5/8 | 13 1/2 | 15 1/2 | + 1/2 | + 3.33 |
| Digital Equipment | 205 | 138 1/2 | 319 | 196 | 186 3/4 | 195 | + 6 | + 3.17 |
| Elect. Comp. Prog. In. | 38 1/4 | 20 5/8 | 197 | 25 3/8 | 22 1/4 | 24 3/8 | - 3/4 | - 2.99 |
| Granite Computer | 45 1/2 | 25 1/8 | 271 | 28 3/4 | 25 1/8 | 26 3/4 | - 1 3/4 | - 6.14 |
| Greyhound Computer | 28 5/8 | 14 3/4 | 272 | 17 1/2 | 14 3/4 | 16 7/8 | + 1/8 | + 0.75 |
| Levin-Townsend Comp. | 57 1/2 | 27 | 1500 | 33 1/4 | 27 | 30 1/8 | - 2 3/8 | - 7.31 |
| Milgo Elect. | 34 1/2 | 20 1/4 | 421 | 26 1/4 | 21 | 22 1/2 | - 3 1/4 | -12.62 |
| Mohawk Data Sciences | 83 7/8 | 59 3/4 | 2410 | 83 7/8 | 74 | 83 3/4 | + 7 1/2 | + 9.83 |
| Planning Research | 33 5/8 | 23 7/8 | 822 | 30 3/4 | 26 5/8 | 29 3/4 | + 1 1/2 | + 5.31 |
| Potter Instrument | 35 3/4 | 26 | 400 | 30 1/8 | 26 | 27 3/8 | - 1 7/8 | - 8.18 |
| Randolph Computers | 43 7/8 | 22 1/4 | 449 | 24 5/8 | 22 5/8 | 24 | - 1/4 | - 1.03 |
| Sys. Eng. Labs. | 36 | 26 1/8 | 889 | 32 5/8 | 29 5/8 | 32 | + 1 5/8 | + 5.35 |
| Telex | 37 5/8 | 20 3/4 | 850 | 40 | 30 3/4 | 35 | + 2 5/8 | + 8.11 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 3.75 | - 0.93 |

| OVER-THE-COUNTER | 1969 High Bid | 1969 Low Bid | June 27, Bid | June 27, Asked | 2 weeks ago Bid | 2 week net change Bid | 2 week % change Bid |
|---|---|---|---|---|---|---|---|
| Applied Data Research, Inc. | 40 | 29 | 29 | 31 | 36 | - 7 | -19.44 |
| Aries Corp. | 19 | 7 3/4 | 8 1/4 | 8 3/4 | 8 1/2 | - 1/4 | - 2.94 |
| Bolt, Beranek & Newman, Inc. | 19 | 12 1/2 | 12 3/4 | 13 3/4 | 13 3/4 | - 1 | - 7.27 |
| Computer Usage | 40 | 16 | 16 | 17 | 17 | - 1 | - 5.88 |
| Cyber-tronics | 12 1/2 | 8 | 8 1/8 | 8 1/2 | 8 | + 1/8 | + 1.56 |
| Digitronics | 22 1/2 | 13 1/2 | 13 3/4 | 14 3/4 | 13 3/4 | -- | -- |
| DPA, Inc. | 16 1/4 | 10 | 11 3/8 | 11 7/8 | 11 3/8 | -- | -- |
| Electronic Memories | 62 | 46 | 52 1/2 | 53 1/2 | 51 1/2 | + 1 | + 1.94 |
| Fabri-Tek | 12 7/8 | 8 3/4 | 9 | 9 1/2 | 9 3/8 | - 3/8 | - 4.00 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 24 1/2 | 25 1/2 | 26 1/2 | - 2 | - 7.55 |
| LMC Data, Inc. | 8 1/4 | 4 3/4 | 5 | 5 3/4 | 5 1/2 | - 1/2 | - 9.09 |
| Management Assistance | 14 7/8 | 5 3/8 | 5 5/8 | 6 | 6 1/8 | - 1/2 | - 8.16 |
| Optical Scanning Corp. | 118 | 54 | 60 | 63 | 54 | + 6 | +11.11 |
| Recognition Equipment, Inc. | 76 | 54 | 59 | 60 | 57 | + 2 | + 3.51 |
| Tally Corp. | 38 | 18 | 19 | 20 1/2 | 21 | - 2 | - 9.52 |
| TBS Computer Center Corp. | 36 | 11 | 21 | 23 | 25 1/2 | - 4 1/2 | -17.65 |
| University Computing | 155 | 68 | 68 | 70 | 68 | -- | -- |



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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 19,1969●VOL.4,NO.23 P.J.McGOVERN,EDITOR

Third-party computer leasing

## UNBUNDLING, OVER SHORT TERM, WON'T AFFECT COMPUTER LEASING; LONG-TERM EFFECT COULD BE TO ACCELERATE LOSS OF VALUE OF CURRENT 360'S

The third-party computer leasing companies -- many of which are prone to shout and scream over every action or inaction from IBM -- actually may be the short-to-medium-term winners in the unbundled computer marketplace created recently by IBM (EDP/IR July 14, 1969). Most leasing company executives have vocalized on this point, and a recent survey and analysis conducted by EDP/IR tends to bear this out.

Shortly after IBM announced its separate pricing policies, EDP/IR contacted 15 computer users who currently have IBM equipment on lease from a third-party leasing firm. The results were mixed: Many of the lessees had not even discussed unbundling with their leasing companies; of those who had, most were planning no changes in their relations with them -- until their contracts expired, which in most cases, was two or three years away. About the only result from the survey was that in the very short run, unbundling will have virtually no impact on computer leasing companies.

In the medium-range perspective, unbundling has been curiously good for leasing companies . . . in a backhanded sort of way. Unbundling virtually protects their position in currently installed 360s; but it did not change other IBM policies which will probably mean the end of large-scale computer leasing. Here are some of the market considerations that will affect third-party leasing companies in the unbundled computer environment:

- The whole problem of "subsequent user support" (EDP/IR Feb.28, 1968) is now a problem of record; all IBM computer users -- whether owners, lessees, or renters -- will pay the same rates for software and systems engineering support.

- For simple economic reasons, the leasing companies will probably not buy very many new computer systems over the next few years. With unbundling, however, the demand for presently owned equipment should be expected to rise and leasing rates, correspondingly, can be expected rise also.

- Leasing companies can expect to keep all of their computers on lease -- at current or slightly reduced lease rates -- for three or four more years. After that, leasing rates on the current models should fall sharply as they are forced to compete with newer and more efficient models, with more advanced program products.

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## The economics of computer leasing

The computer leasing business began to surface as long ago as 1964, but it did not reach a significant level of activity until very recently, when it suddenly exploded. A recent study by the International Data Corporation estimates that leasing company purchases of computer equipment rose from $10 million in 1964, to over $1 billion last year. Total leasing company holdings have risen to the $2 billion neighborhood, which means that they own well over 10% of the value of installed computers in this country, making them, as a group, the second largest supplier of computers. Significantly, well over 80% of these holdings are IBM-made.

Leasing company purchases peaked in 1968, when they amounted to almost a quarter of the value of new installations in the country. Such purchases are expected to fall off sharply this year, because of the high interest rates and the age of existing computer models. The IDC study estimated that 1969 purchases would reach $400 to $600 million, but that a large part of that will be peripherals and other supplemental equipment needed by leasing company customers who want to up-grade. Very few purchases of new systems are planned.

The basic principle of computer leasing is that each leased computer should, over its lifetime, generate sufficient revenue to cover the costs of purchasing, financing and marketing it -- and still leave a profit. Basically then, what a leasing company is interested in is how many months it has to have the computer on lease before it gets back its costs plus interest, and how much additional revenue it can generate thereafter, either by continued lease or sale. If the computer is expected to reach the break-even point and then continue to yield substantial additional revenue, it is obviously a good business proposition. Otherwise, it is obviously not.

EDP/IR has constructed a table which sheds light on the nature of the break-even point. To simplify the presentation, we have not included any marketing expenses. The resulting figures allow the interaction of the interest rate and the size of the lease fee to be easier to see, and rough corrections can be made for it by, for instance, adding a few months to the figures in the table.

| Monthly Lease Fee | Interest Rate | | | | |
|---|---|---|---|---|---|
| | 0% | 4% | 6% | 8% | 12% |
| $10,000 | 48 | 52 | 56 | 59 | 66 |
| $ 9,500 | 50 | 53 | 58 | 62 | 71 |
| $ 9,000 | 53 | 58 | 62 | 67 | 76 |
| $ 8,500 | 57 | 63 | 66 | 72 | 85 |
| $ 8,000 | 60 | 65 | 72 | 78 | 93 |

The table shows the number of months a $480,000 computer would have to be out on lease at various lease fee sizes under different interest rate conditions in order to just pay for its purchase price and to meet the interest charges on that money. The IBM rental for such a system would be about $10,000, so the lower lease fees represent 5%, 10%, 15% and 20% discounts from the IBM rates, respectively.



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Both the interest rate and lease rates fluctuate with market conditions and the actual break-even point is sensitive to these fluctuations. Leasing companies have been able to insulate themselves somewhat by signing long term leases with fixed lease rates and occasionally by borrowing money with non-fluctuating interest rates. Three, four, and five-year contracts are actually the rule in the leasing business, but a great deal of the money they have borrowed has come through revolving credit arrangements which have interest rates pegged at some fraction above the prime rate. Consequently, leasing companies are now paying 9% or more on much of their outstanding debt.

Although lease fees are generally fixed by their contracts for long periods, the size of the fee is determined by the market conditions at the time the lease is signed, and has fluctuated widely during the last few years. There are over 140 leasing companies, all competing for the same business, including twelve firms with computer holdings over $100 million. In general, lease fees have been in the neighborhood of 85% of IBM's rental rates (the recovery period for this rate is shown in the $8500 column of the table), but extreme competition has produced lease fees as low as 70% of IBM's rate. It would be highly unusual for a firm to purchase a computer intending to lease it on this basis, because of the long recovery period (over 90 months at 8% interest), but it is quite possible when the leasing company already owns the equipment. A low lease fee is better than no lease fee, although there is the consideration that market conditions may improve, given time. This consideration must be tempered with the knowledge that it is better to grant a 4% rate reduction on a two-year lease rather than wait a month to find a customer willing to pay the higher rate. If a company has to grant such a discount to close a deal, it will.

Far from being a curse, this ability to adjust prices to market conditions is the key to the leasing companies' future. Most manufacturers, who own the bulk of existing computers, do not have this freedom because of the short terms of their rental contracts. Should a manufacturer lower a price on a single installation, it would be forced, because price discrimination is illegal, to offer equally low rates to all users of similar equipment. In most cases, the revenue that would be lost from all the existing users would far outweigh the revenue to be gained from the new customer. In short, the manufacturers find it to their economic advantage to maintain steady prices, even if leasing companies are free to lure away some of their users with lower rates. This will enable the leasing companies to keep their computers on lease even when the total number of such computers begins to shrink. The manufacturers will be forced to absorb the shrinkage to protect the price level.

In any case, once the break-even point has been passed, the computer starts to generate profits. These profits are even sweetened by the applicability of the investment tax credit to them, so the firm can make an additional after-tax profit equal to 7% of the cost of the investment -- provided that sufficient profits are made to enable the firm to use all of its tax credits. The profits currently being shown by leasing companies are possible only through the use of artificial accounting techniques which, in effect, try to estimate the profits that will eventually be realized and spread them over a number of years. These techniques hide a number of rough assumptions and are so artificial that the resulting profit figures are almost meaningless. They simply do not take account of many of the critical parameters that actually will determine how much profit is made. Far more realistic values can be had by estimating the leasing companies' future profits directly, using your own assumptions, and calculating the present value of the estimates.



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Leasing's prospects

There are two aspects of leasing's future that must be discussed separately; the prospects for success with the investments which have already been made, and the likelihood of future investments. The first problem is the most pressing, so we shall tackle it first.

In the short run, over the next three or four years, current leasing rates should be reasonably stable as a result of IBM's announced policies. Leasing companies will no longer find it necessary to grant substantial discounts at renewal time to compensate "second-users" for the reduced free services available to them from IBM. This means that lease rates on used computers will probably not fall 5% to 10% below the pre-unbundling norm. Except for the inconvenience and expense of finding new customers, leasing companies will not have to economically differentiate between first and subsequent users. Renewal discounts will probably continue, but they should be much reduced.

Another factor contributing to the stability in lease rates is the increased number of potential lessees. The unbundled computer environment is going to be more cost conscious and many more users will be looking for ways to save on their hardware bills. Since the supply of leasing company-owned computers is not going to grow very much, for reasons given earlier, there will be a good support level on leasing rates.

In the medium run, from 1972 into the mid-1970s, the present models are going to start being scrapped, after being driven from the market by newer models. If past experience is any guide though, large numbers of third generation computers will continue to be used throughout this period. Just looking at the number of second generation machines still in use, according to the Monthly Computer Census, is enough to make this argument convincing.

Because the manufacturers will not be able to lower their prices to compete with the leasing companies, virtually all of the scrapped machines will be manufacturer-owned. Unless users turn out to be far less cost conscious than we expect, leasing companies should be able to keep all of their serviceable equipment on lease, generating revenue, at roughly the current rates. The manufacturers' efforts to support the prices of their own computer bases will support the leasing companies' prices as well.

This situation could be seen developing long ago, at the point when leasing companies began to accumulate substantial computer holdings. We wondered then what IBM would do about it, because the profits that leasing companies make all would have accrued to IBM had the leasing company died in infancy. For a while it seemed likely that IBM's threat of second-users discrimination would be carried out, because it was both legal and effective, but now IBM has ruled that possibility out with its unbundling announcement and is now apparently going to accept the situation as it is shaping up.

Eventually, the pricing flexibility available to IBM through unbundling could result in a sharp reduction in the revenue producing life of the current 360 line. IBM has traditionally made a new computer series more attractive to users by offering a better price/performance. Now it can promote switch-over to the new product line from the 360 not only with hardware improvements, but also by offering desirable program products exclusively on the new product line, or perhaps at significantly lower prices on it. If IBM really wants to up-grade



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its current users in a hurry, leasing companies may be feeling the pinch by 1973. Otherwise, it could be as long as 1975. In any case, when the leasing company 360s start having to compete on a price basis with the performance of the new product line, their prices are going to fall very sharply.

How far and how fast prices will fall is uncertain. What is certain is that they will fall far enough to keep all of the leasing companies' serviceable computers on lease, generating revenue. The only costs to such leases will be the marketing and overhead costs of running the business. Any revenue generated above those costs will be profit, and the leasing companies can be expected to keep their machines on lease for as long as they can find customers for them, or rather, until the revenues thus generated are less than the marketing costs.

Leasing's long-term prospects

It is doubtful that leasing companies are going to play the same role in the next series of computers that are introduced. They owe their existence today to the purchase-to-rent ratios that were set for third generation equipment and it seems likely that future equipment will have higher ratios, if for no other reason than to discourage leasing company purchases. The profits being made by leasing companies on third generation equipment would have been made by the manufacturers had leasing companies never existed.

IBM has already set the pattern of higher ratios with its 360/25 and 360/85, which have ratios in the 55-to-1 and 58-to-1 range. The recently introduced System/3 has a 45-to-1 ratio, but EDP/IR suspects that this low ratio reflects the special circumstances surrounding this new line, including the leasing company aversion to small machines, and does not mean that IBM will set equally low ratios for the new models it is expected to announce early next year.

Higher ratios mean that the length of time required to recover the investment in a computer will be longer. For example, at a ratio of 55:1, if the leasing company charged 90% of the manufacturer's rental, it would take 73 months to break even, assuming a 6% interest rate, and 79 months at an 8% interest rate. That makes computer leasing considerably less attractive.

EDP/IR's prognosis for leasing companies is that they will take their profits and run. The current trend of diversification into non-computer fields will continue, but there is a strong possibility that the unbundled environment will attract the leasing companies back into the computer field in such endeavors as software development, facilities management and possibly even equipment manufacture.

ERRATA: In the last issue (August 6, 1969), EDP/IR said: "IBM has announced that it expects to ship 26,000 to 28,000 System/3 units during the next three years." This figure was incorrectly attributed to an official IBM source. In line with long standing policy, IBM does not release to the public estimates of the market potential for its products. EDP/IR understands from a knowledgeable source, however, that the figures quoted are those being used internally by IBM for planning purposes, and it is our opinion that the numbers are conservative. For System/3, as stated in the last issue, EDP/IR continues to think "that a far larger potential market exists and that IBM's estimates are more likely to be low than high."

Also, in the same issue, EDP/IR inadvertently dropped a digit in stating that "a 'typical' disk version goes for $170 per month...." The correct figure is $1870 per month.



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# MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in EDP/IR.

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF June 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Burroughs | 205 | $ 4,600 | 1/54 | 17 | 2 | 19 | X |
| | 220 | $ 14,000 | 10/58 | 23 | 4 | 27 | X |
| | B100 | $ 2,800 | 8/64 | 81 | 11 | 92 | X |
| | B200 Series | $ 5,500 | 11/61 | 422 | 75 | 497 | X |
| | B300 Series | $ 9,500 | 7/65 | 469 | 102 | 571 | 36 |
| | B500 | $ 3,800 | 11/68 | 34 | 4 | 38 | 60 |
| | B2500 | $ 5,000 | 2/67 | 109 | 26 | 135 | 86 |
| | B3500 | $ 14,000 | 5/67 | 137 | 36 | 173 | 168 |
| | B5500 | $ 26,000 | 3/63 | 97 | 10 | 107 | 16 |
| | B6500 | $ 33,000 | 6/69 | 0 | 0 | 0 | 61 |
| | B7500 | $ 44,000 | 9/69 | 0 | 0 | 0 | 15 |
| | B8500 | $200,000 | 4/69 | 1 | 0 | 1 | 4 |
| Control Data Corp. | G-15 | $ 1,600 | 7/55 | 244 | 9 | 253 | X |
| | G-20 | $ 15,500 | 4/61 | 15 | 2 | 17 | X |
| | LGP-21 | $ 725 | 12/62 | 126 | 3 | 129 | X |
| | LGP-30 | $ 1,300 | 9/56 | 90 | 5 | 95 | X |
| | RPC-4000 | $ 1,875 | 1/61 | 43 | 4 | 47 | X |
| | 160*/160A/160G | $2,100/$5,000/$12,000 | 5/60;7/61;3/64 | 445 | 36 | 481 | X |
| | 924/924A | $ 11,000 | 8/61 | 26 | 1 | 27 | X |
| | 1604/1604A | $ 45,000 | 1/60 | 44 | 3 | 47 | X |
| | 1700 | $ 3,800 | 5/66 | 146 | 64 | 210 | 73 |
| | 3100/3150 | $ 10,500 | 12/64 | 110 | 24 | 134 | 12 |
| | 3200 | $ 14,000 | 5/64 | 42 | 15 | 57 | X |
| | 3300 | $ 28,000 | 9/65 | 120 | 31 | 151 | 15 |
| | 3400 | $ 19,000 | 11/64 | 14 | 4 | 18 | X |
| | 3500 | $ 25,000 | 1/69 | 6 | 0 | 6 | 20 |
| | 3600 | $ 52,000 | 6/63 | 30 | 11 | 41 | X |
| | 3800 | $ 53,000 | 2/66 | 17 | 3 | 20 | X |
| | 6400/6500 | $ 58,000 | 5/66 | 58 | 20 | 78 | 23 |
| | 6600 | $115,000 | 8/64 | 54 | 15 | 69 | 15 |
| | 7600 | $240,000 | 1/69 | 1 | 0 | 1 | 6 |
| Digital Equipment Corp. | PDP-1 | $ 3,400 | 11/60 | 50 | 2 | 52 | X |
| | PDP-4 | $ 1,700 | 8/62 | 40 | 5 | 45 | X |
| | PDP-5 | $ 900 | 9/63 | 90 | 10 | 100 | X |
| | PDP-6 | $ 10,000 | 10/64 | 18 | 3 | 21 | X |
| | PDP-7 | $ 1,300 | 11/64 | 124 | 36 | 160 | X |
| | PDP-8 | $ 525 | 4/65 | 1189 | 255 | 1444 | 16 |
| | PDP-9/9L | $ 1,100 | 12/66 | 270 | 89 | 359 | 22 |
| | PDP-10 | $ 11,000 | 10/67 | 61 | 15 | 76 | 33 |
| | PDP-15 | $ 900 | 12/69 | 0 | 0 | 0 | 40 |
| Electronic Associates | 640 | $ 1,200 | 9/67 | 78 | 32 | 110 | 10 |
| | 8400 | $ 10,000 | 6/65 | 21 | 6 | 27 | 1 |
| EMR Computer | ASI 210 | $ 3,850 | 4/62 | 10 | 0 | 10 | X |
| | ASI 2100 | $ 4,200 | 12/63 | 8 | 0 | 8 | X |
| | ADVANCE 6020 | $ 4,400 | 4/65 | 17 | 0 | 17 | 1 |
| | ADVANCE 6040 | $ 5,600 | 7/65 | 8 | 3 | 11 | 3 |
| | ADVANCE 6050 | $ 9,000 | 2/66 | 15 | 4 | 19 | 0 |
| | ADVANCE 6070 | $ 15,000 | 10/65 | 3 | 2 | 5 | 0 |
| | ADVANCE 6130 | $ 1,550 | 10/67 | 39 | 7 | 46 | 16 |
| General Electric | 105 | $ 1,350 | 7/69 | 0 | 0 | 0 | 180 |
| | 115 | $ 2,200 | 12/65 | 417 | 713 | 1130 | 110 |
| | 130 | $ 4,500 | 3/69 | 2 | 6 | 8 | 150 |
| | 205 | $ 2,900 | 6/64 | 10 | 0 | 10 | X |
| | 210 | $ 16,000 | 7/59 | 29 | 0 | 29 | X |
| | 215 | $ 6,000 | 9/63 | 18 | 2 | 20 | X |
| | 225 | $ 8,800 | 4/61 | 141 | 19 | 160 | X |
| | 235 | $ 12,500 | 4/64 | 121 | 25 | 146 | 4 |
| | 405 | $ 6,200 | 2/68 | 56 | 14 | 70 | 27 |
| | 415 | $ 11,000 | 5/64 | 327 | 94 | 421 | 19 |
| | 425 | $ 19,500 | 6/64 | 124 | 33 | 157 | 22 |
| | 435 | $ 27,000 | 9/65 | 35 | 8 | 43 | 9 |
| | 615 | $ 40,000 | 6/69 | 0 | 0 | 0 | 8 |
| | 625 | $ 54,000 | 4/65 | 26 | 4 | 30 | 0 |
| | 635 | $ 62,000 | 5/65 | 42 | 5 | 47 | 20 |
| | 645 | $ 90,000 | 7/66 | 9 | 0 | 9 | 0 |
| | GE-PAC 4020 | $ 5,000 | 2/67 | 120 | 37 | 157 | 41 |
| | GE-PAC 4040 | $ 3,000 | 8/64 | 45 | 20 | 65 | X |
| | GE-PAC 4050 | $ 7,000 | 12/66 | 21 | 1 | 22 | X |
| | GE-PAC 4060 | $ 8,500 | 6/65 | 18 | 2 | 20 | X |
| Hewlett-Packard | 2000A | $ 2,500 | 11/68 | 10 | 0 | 10 | 59 |
| | 2005A | $ 1,900 | 7/69 | 0 | 0 | 0 | 5 |



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AS OF June 1, 1969

| NAME OF MANUFACTURER | COMPUTER MODEL | AVERAGE MONTHLY RENTAL | DATE OF FIRST INSTALLATION | NUMBER OF INSTALLATIONS IN U.S. | NUMBER OF INSTALLATIONS OUTSIDE U.S. | TOTAL NUMBER OF INSTALLATIONS | TOTAL NUMBER UNFILLED ORDERS |
|---|---|---|---|---|---|---|---|
| Honeywell | DDP-24 | $ 2,500 | 5/63 | 70 | 2 | 72 | X |
| | DDP-116 | $ 950 | 4/65 | 206 | 44 | 250 | 10 |
| | DDP-124 | $ 2,150 | 3/66 | 51 | 30 | 81 | 7 |
| | DDP-224 | $ 3,600 | 3/65 | 52 | 10 | 62 | 8 |
| | DDP-516 | $ 780 | 9/66 | 250 | 70 | 320 | 145 |
| | H-110 | $ 2,500 | 9/68 | 39 | 16 | 55 | 84 |
| | H-120 | $ 4,200 | 1/66 | 755 | 190 | 945 | 60 |
| | H-125 | $ 5,000 | 12/67 | 132 | 35 | 167 | 105 |
| | H-200 | $ 9,200 | 3/64 | 833 | 351 | 1184 | 60 |
| | H-400 | $ 8,500 | 12/61 | 49 | 37 | 86 | X |
| | H-632 | $ 3,500 | 12/68 | 12 | 0 | 12 | 36 |
| | H-800 | $ 30,000 | 12/60 | 57 | 14 | 71 | X |
| | H-1200 | $ 11,600 | 2/66 | 247 | 64 | 311 | 41 |
| | H-1250 | $ 12,000 | 8/68 | 35 | 12 | 47 | 87 |
| | H-1400 | $ 14,000 | 1/64 | 7 | 2 | 9 | X |
| | H-1800 | $ 50,000 | 1/64 | 16 | 4 | 20 | X |
| | H-2200 | $ 16,500 | 1/66 | 133 | 31 | 164 | 66 |
| | H-3200 | $ 18,000 | 2/70 | 0 | 0 | 0 | 11 |
| | H-4200 | $ 20,500 | 9/68 | 8 | 0 | 8 | 18 |
| | H-8200 | $ 50,000 | 2/69 | 3 | 0 | 3 | 9 |
| IBM | 305 | $ 3,600 | 12/57 | 49 | 19 | 68 | X |
| | 360/20 | $ 2,800 | 12/65 | 6260 | 4140 | 10,400 | 2450 |
| | 360/25 | $ 5,330 | 10/68 | 800 | 200 | 1000 | 3400 |
| | 360/30 | $ 8,800 | 5/65 | 6325 | 3575 | 9900 | 450 |
| | 360/40 | $ 16,800 | 4/65 | 2785 | 1145 | 3930 | 310 |
| | 360/44 | $ 15,000 | 7/66 | 281 | 59 | 340 | 52 |
| | 360/50 | $ 32,000 | 8/65 | 1135 | 260 | 1395 | 605 |
| | 360/65 | $ 60,000 | 11/65 | 532 | 107 | 639 | 254 |
| | 360/67 | $138,000 | 6/66 | 54 | 12 | 66 | 53 |
| | 360/75 | $ 81,400 | 1/66 | 39 | 8 | 47 | 8 |
| | 360/85 | $155,000 | 10/69 | 0 | 0 | 0 | 30 |
| | 360/90 Series | $150,000 | 11/67 | 16 | 0 | 16 | 3 |
| | 650 | $ 4,800 | 11/54 | 60 | 22 | 82 | X |
| | 1130 | $ 1,700 | 2/66 | 3255 | 1305 | 4560 | 1910 |
| | 1401 | $ 6,200 | 9/60 | 2695 | 1805 | 4500 | X |
| | 1401-G | $ 2,300 | 5/64 | 545 | 565 | 1110 | X |
| | 1401-H | $ 1,300 | 6/67 | 225 | 165 | 390 | X |
| | 1410 | $ 17,000 | 11/61 | 285 | 170 | 455 | X |
| | 1440 | $ 4,100 | 4/63 | 1615 | 1185 | 2800 | X |
| | 1460 | $ 9,800 | 10/63 | 564 | 101 | 665 | X |
| | 1620 I, II | $ 4,000 | 9/60 | 809 | 446 | 1255 | X |
| | 1800 | $ 5,000 | 1/66 | 472 | 168 | 640 | 238 |
| | 7010 | $ 26,000 | 10/63 | 99 | 16 | 115 | X |
| | 702 | $ 6,900 | 2/55 | 3 | 0 | 3 | X |
| | 7030 | $160,000 | 5/61 | 5 | 1 | 6 | X |
| | 704 | $ 32,000 | 12/55 | 14 | 2 | 16 | X |
| | 7040 | $ 25,000 | 6/63 | 63 | 43 | 106 | X |
| | 7044 | $ 36,500 | 6/63 | 62 | 21 | 83 | X |
| | 705 | $ 38,000 | 11/55 | 26 | 5 | 31 | X |
| | 7070, 2, 4 | $ 27,000 | 3/60 | 148 | 82 | 230 | X |
| | 7080 | $ 60,000 | 8/61 | 75 | 3 | 78 | X |
| | 709 | $ 40,000 | 8/58 | 2 | 0 | 2 | X |
| | 7090 | $ 63,500 | 11/59 | 27 | 6 | 33 | X |
| | 7094 I/II | $ 77,300 | 9/62;4/64 | 172 | 11 | 183 | X |
| National Cash Register | NCR-304 | $ 14,000 | 1/60 | 18 | 2 | 20 | X |
| | NCR-310 | $ 2,500 | 5/61 | 9 | 0 | 9 | X |
| | NCR-315 | $ 9,000 | 5/62 | 427 | 373 | 800 | 17 |
| | NCR-315-RMC | $ 12,500 | 9/65 | 104 | 26 | 130 | 13 |
| | NCR-390 | $ 1,950 | 5/61 | 545 | 285 | 830 | X |
| | NCR-500 | $ 1,650 | 10/65 | 1890 | 860 | 2750 | 200 |
| | Century-100 | $ 2,645 | 9/68 | 113 | 13 | 126 | 774 |
| | Century-200 | $ 7,500 | 4/69 | 16 | 2 | 18 | 390 |
| Philco | 1000 | $ 7,010 | 6/63 | 13 | 1 | 14 | X |
| | 2000-210, 211 | $ 40,000 | 10/58 | 12 | 1 | 13 | X |
| | 2000-212 | $ 52,000 | 1/63 | 12 | 1 | 13 | X |
| RCA | RCA 301 | $ 7,500 | 2/61 | 387 | 201 | 588 | X |
| | RCA 3301 | $ 19,000 | 7/64 | 77 | 8 | 85 | X |
| | RCA 501 | $ 14,000 | 6/59 | 71 | 2 | 73 | X |
| | RCA 601 | $ 35,000 | 11/62 | 4 | 0 | 4 | X |
| | Spectra 70/15 | $ 4,500 | 9/65 | 125 | 83 | 208 | 17 |
| | Spectra 70/25 | $ 7,200 | 9/65 | 80 | 44 | 124 | 12 |
| | Spectra 70/35 | $ 8,400 | 1/67 | 122 | 83 | 205 | 77 |
| | Spectra 70/45 | $ 24,000 | 11/65 | 239 | 83 | 322 | 42 |
| | Spectra 70/46 | $ 33,400 | 11/68 | 5 | 0 | 5 | 9 |
| | Spectra 70/55 | $ 35,000 | 11/66 | 16 | 3 | 19 | 12 |
| | Spectra 70/60 | $ 38,000 | 9/70 | 0 | 0 | 0 | 5 |
| Raytheon | 250 | $ 1,200 | 12/60 | 110 | 43 | 153 | X |
| | 440 | $ 3,500 | 3/64 | 17 | 2 | 19 | X |
| | 520 | $ 3,200 | 10/65 | 22 | 3 | 25 | X |
| Scientific Control Corp. | 655 | $ 1,800 | 10/66 | 95 | 0 | 95 | 15 |
| | 660 | $ 2,000 | 10/65 | 78 | 7 | 85 | 32 |
| | 4700 | $ 800 | 4/69 | 7 | 0 | 7 | 82 |
| | 6700 | $ 16,000 | 11/69 | 0 | 0 | 0 | 2 |
| Scientific Data Systems | SDS-92 | $ 1,500 | 4/65 | 61 | 5 | 66 | X |
| | SDS-910 | $ 2,000 | 8/62 | 170 | 15 | 185 | X |
| | SDS-920 | $ 2,900 | 9/62 | 137 | 19 | 156 | X |
| | SDS-925 | $ 3,000 | 12/64 | 21 | 2 | 23 | X |
| | SDS-930 | $ 3,400 | 6/64 | 142 | 19 | 161 | X |
| | SDS-940 | $ 25,000 | 4/66 | 49 | 4 | 53 | 18 |
| | SDS-9300 | $ 8,500 | 11/64 | 29 | 2 | 31 | X |
| | Sigma 2 | $ 1,800 | 12/66 | 183 | 37 | 220 | 115 |
| | Sigma 5 | $ 7,000 | 8/67 | 78 | 31 | 109 | 58 |
| | Sigma 7 | $ 13,500 | 12/66 | 60 | 16 | 76 | 20 |
| Standard Computer Corp. | IC6000 | $ 18,000 | 5/67 | 15 | 0 | 15 | 6 |
| | IC4000 | $ 10,000 | 9/68 | 5 | 0 | 5 | 6 |
| Systems Eng Labs | 810 | $ 1,000 | 9/65 | 22 | 2 | 24 | X |
| | 810 A/B | $900/$1,100 | 8/66;12/68 | 166 | 11 | 177 | 11 |
| | 840 | $ 1,400 | 11/65 | 3 | 0 | 3 | X |
| | 840 A/MP | $1,400/$1,600 | 8/66;10/67 | 57 | 0 | 57 | 8 |
| UNIVAC | I & II | $ 25,000 | 3/51 & 11/57 | 15 | 0 | 15 | X |
| | III | $ 21,000 | 8/62 | 69 | 13 | 82 | X |
| | File Computers | $ 15,000 | 8/56 | 7 | 0 | 7 | X |
| | SS 80, 90 & Step | $ 8,000 | 8/58 | 95 | 66 | 161 | X |
| | 418 | $ 11,700 | 6/63 | 100 | 51 | 151 | 11 |
| | 490 Series | $ 32,000 | 12/61 | 184 | 26 | 210 | 19 |
| | 1004 | $ 1,900 | 2/63 | 1630 | 960 | 2590 | X |
| | 1005 | $ 2,550 | 4/66 | 970 | 440 | 1410 | 25 |
| | 1050 | $ 8,800 | 9/63 | 174 | 89 | 263 | X |
| | 1101-1105 | $ 35,000 | 12/50 | 6 | 0 | 6 | X |
| | 1106 | $ 37,000 | 2/70 | 0 | 0 | 0 | 13 |
| | 1107 | $ 57,000 | 10/62 | 18 | 8 | 26 | X |
| | 1108 | $ 68,000 | 9/65 | 147 | 55 | 202 | 106 |
| | 9200 | $ 1,600 | 6/67 | 331 | 108 | 439 | 480 |
| | 9300 | $ 3,600 | 9/67 | 190 | 67 | 257 | 385 |
| | 9400 | $ 7,000 | 5/69 | 3 | 0 | 3 | 125 |
| | LARC | $135,000 | 5/60 | 1 | 0 | 1 | X |
| | | | | 48,837 | 22,703 | 71,540 | 15,021 |



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June 30, - August 1, 1969

| | 1969 High | 1969 Low | 5 week Sales in 100's | 5 week High | 5 week Low | Last | 5 week Net Change | 5 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 82 3/4 | 59 1/2 | 2410 | 76 3/8 | 59 1/2 | 62 | -12 1/4 | -16.49 |
| American R & D | 210 | 154 1/2 | 1032 | 210 | 172 1/2 | 193 1/4 | - 4 | - 2.03 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 5030 | 44 3/4 | 35 1/4 | 40 | - 2 1/8 | - 5.04 |
| Bunker Ramo | 17 5/8 | 9 1/2 | 4595 | 13 | 9 1/2 | 11 1/4 | + 1/8 | + 1.12 |
| Burroughs | 141 5/8 | 120 3/4 | 7803 | 141 5/8 | 121 | 137 | -- | -- |
| Collins Radio | 69 3/4 | 41 3/8 | 2603 | 48 1/2 | 41 3/8 | 44 3/4 | -- | -- |
| +Computer Sciences | 30 7/8 | 22 1/2 | 12767 | 30 7/8 | 22 1/2 | 24 3/4 | - 1/2 | - 1.98 |
| Control Data | 159 1/4 | 125 1/8 | 10083 | 154 | 135 1/2 | 148 | - 1 | - 0.67 |
| Electronic Assoc. | 25 1/4 | 13 1/4 | 1093 | 19 1/2 | 13 1/4 | 15 5/8 | - 2 | -11.35 |
| General Electric | 98 1/4 | 83 1/4 | 6432 | 91 1/4 | 83 1/4 | 86 3/8 | - 4 3/8 | - 4.82 |
| *Granite Computer | 25 3/8 | 15 | 1187 | 18 7/8 | 15 | 15 3/8 | - 2 7/8 | -15.75 |
| Honeywell | 140 3/4 | 107 3/4 | 3277 | 137 | 118 7/8 | 125 | - 3 1/4 | - 2.53 |
| IBM | 354 1/2 | 291 3/4 | 9531 | 354 1/2 | 310 | 329 1/2 | - 2 | - 0.60 |
| ITT | 58 1/2 | 46 1/4 | 7899 | 53 | 46 1/4 | 47 1/2 | - 2 1/8 | - 4.28 |
| Leasco | 54 | 23 1/8 | 9545 | 34 7/8 | 23 1/8 | 28 1/4 | - 2 1/2 | - 8.13 |
| Litton | 74 1/2 | 37 1/8 | 7859 | 48 1/8 | 37 1/8 | 41 7/8 | - 5 1/2 | -11.61 |
| Memorex | 89 3/4 | 65 | 4885 | 86 7/8 | 74 3/8 | 81 7/8 | - 1/8 | - 0.15 |
| National Cash Register | 139 3/8 | 108 | 4748 | 133 1/2 | 119 | 131 3/4 | + 6 | + 4.77 |
| RCA | 48 1/8 | 35 1/2 | 9086 | 41 5/8 | 35 1/2 | 38 1/8 | - 3 | - 7.22 |
| Raytheon | 50 1/4 | 30 5/8 | 2052 | 36 3/8 | 31 | 34 | + 5/8 | + 1.87 |
| Sanders | 61 7/8 | 22 5/8 | 2905 | 31 3/4 | 22 5/8 | 27 3/8 | - 2 1/8 | - 7.46 |
| SCM | 47 1/8 | 28 | 2420 | 37 7/8 | 28 | 32 1/2 | - 3 | - 8.45 |
| Singer | 84 1/4 | 62 | 3207 | 71 7/8 | 62 | 66 3/8 | - 5 1/8 | - 7.07 |
| Sperry Rand | 55 1/2 | 38 3/8 | 21132 | 55 1/2 | 38 3/8 | 43 3/4 | - 9 7/8 | -18.41 |
| Teledyne | 45 1/2 | 28 1/4 | 7811 | 35 1/8 | 28 1/4 | 32 5/8 | + 2 1/8 | + 6.97 |
| Xerox | 100 1/2 | 85 1/4 | 17912 | 100 | 86 | 94 1/8 | - 4 3/8 | - 4.44 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | - 2.01 | - 4.15 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Applied Data Research | 32 7/8 | 28 3/4 | 73 | 32 7/8 | 28 3/4 | 30 | + 1 | + 3.45 |
| Automatic D P | 83 1/4 | 63 1/4 | 589 | 78 1/2 | 67 5/8 | 75 5/8 | + 1 1/2 | + 2.02 |
| Calcomp | 37 1/2 | 18 1/4 | 1041 | 28 3/4 | 18 1/4 | 21 5/8 | - 6 1/4 | -22.42 |
| Clary Corp. | 25 3/4 | 10 3/8 | 828 | 15 1/4 | 10 3/8 | 14 1/2 | - 1/8 | - 0.85 |
| Computer Applications | 21 7/8 | 9 1/2 | 389 | 14 1/2 | 9 1/2 | 11 | - 2 3/4 | -20.00 |
| Computing and Software | 56 3/8 | 37 | 562 | 48 7/8 | 43 3/8 | 45 5/8 | - 2 3/8 | - 4.95 |
| Data Proc. Fin. & Gen. | 60 1/4 | 23 5/8 | 2337 | 38 1/2 | 23 5/8 | 28 | - 6 1/2 | -18.84 |
| Data Products | 27 7/8 | 12 3/8 | 3855 | 17 3/4 | 12 3/8 | 13 | - 2 1/2 | -16.12 |
| +Digital Equipment | 72 | 54 1/2 | 4331 | 72 | 54 1/2 | 63 3/4 | - 1 1/4 | - 1.92 |
| *DPA Inc. | 12 | 9 | 430 | 12 | 9 | 9 7/8 | - 1 1/2 | -13.19 |
| Elect. Comp. Prog. In. | 38 1/4 | 12 5/8 | 575 | 24 5/8 | 12 3/8 | 13 1/4 | -11 1/8 | -45.61 |
| Greyhound Computer | 28 5/8 | 12 5/8 | 625 | 19 | 12 5/8 | 14 7/8 | - 2 | -11.85 |
| Levin-Townsend Comp. | 57 1/2 | 24 1/8 | 3310 | 34 1/4 | 24 1/8 | 28 1/4 | - 1 7/8 | - 6.22 |
| Milgo Elect. | 34 1/2 | 17 7/8 | 1029 | 26 1/4 | 17 7/8 | 23 | + 1/2 | + 2.13 |
| Mohawk Data Sciences | 87 | 59 3/4 | 6038 | 87 | 73 | 81 5/8 | - 2 1/8 | - 2.54 |
| Planning Research | 33 5/8 | 23 7/8 | 1577 | 31 3/8 | 27 | 31 | + 1 1/4 | + 4.20 |
| Potter Instrument | 35 3/4 | 23 3/4 | 974 | 28 3/8 | 23 3/4 | 27 3/4 | + 3/8 | + 1.37 |
| Randolph Computers | 43 7/8 | 18 | 1479 | 27 3/4 | 18 | 27 1/2 | + 3 1/2 | +14.58 |
| Sys. Eng. Labs. | 36 | 26 1/8 | 1710 | 34 1/2 | 29 3/4 | 33 7/8 | + 1 7/8 | + 5.85 |
| Telex | 44 | 20 3/4 | 7214 | 44 | 33 1/4 | 44 | + 9 | +25.71 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | - 1.07 | - 5.26 |

| | 1969 High Bid | 1969 Low Bid | Aug. 1, Bid | Aug. 1, Asked | 5 weeks ago Bid | 5 week net change Bid | 5 week % change Bid |
|---|---|---|---|---|---|---|---|
| OVER-THE-COUNTER | | | | | | | |
| Aries Corp. | 19 | 6 1/4 | 6 1/2 | 7 | 8 1/4 | - 1 3/4 | -21.21 |
| Bolt, Beranek & Newman, Inc. | 19 | 7 1/2 | 9 3/4 | 10 3/4 | 12 3/4 | - 3 | -23.53 |
| Computer Usage | 40 | 14 1/2 | 15 | 16 | 16 | - 1 | - 6.25 |
| Cyber-tronics | 12 1/2 | 7 | 7 1/4 | 7 3/4 | 8 1/8 | - 7/8 | -10.77 |
| Digitronics | 22 1/2 | 13 1/2 | 16 1/2 | 17 1/2 | 13 3/4 | + 2 3/4 | +20.00 |
| Electronic Memories | -- | -- | -- | -- | 52 1/2 | -- | -- |
| Fabri-Tek | 12 7/8 | 7 1/2 | 8 5/8 | 9 1/8 | 9 | - 3/8 | - 4.17 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 22 1/4 | 23 | 24 1/2 | - 2 1/4 | - 9.18 |
| LMC Data, Inc. | 8 1/4 | 3 3/4 | 3 3/4 | 4 1/2 | 5 | - 1 1/4 | -25.00 |
| Management Assistance | 14 7/8 | 4 3/8 | 4 7/8 | 5 1/4 | 5 5/8 | - 3/4 | -13.33 |
| Optical Scanning Corp. | 118 | 54 | 65 | 68 | 60 | + 5 | + 8.33 |
| Recognition Equipment Inc. | 76 | 52 | 54 | 56 | 59 | - 5 | - 8.47 |
| Tally Corp. | 36 | 15 | 16 1/2 | 18 | 19 | - 2 1/2 | -13.16 |
| TBS Computer Center Corp. | 36 | 11 | 17 | 19 | 21 | - 4 | -19.04 |
| University Computing | 155 | 55 | 56 | 58 | 68 | -12 | -17.65 |

\+ Stock split
* New listing on this exchange



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E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 29,1969 • VOL.4,NO.24 P.J.McGOVERN,EDITOR

# IBM EXPANDS SYSTEM/360 WITH A GIANT COMPUTER; THIS TIME, APPARENTLY, IT'S NOT A "PHANTOM" MACHINE

*With a standard hammer, and an average anvil, you can smash a typical pebble to smithereens. Perhaps, if you built the largest hammer in the world, and the largest anvil -- and if you could lift the hammer -- you could crush boulders into sand.*

-- ex-IBM sales manager

IBM's new System/360 Model 195, according to the company's announcement last week, "is the most powerful computer in IBM's product line. It uses monolithic circuits, has a high performance buffer memory and can perform many functions simultaneously. [It] has an internal processing speed about twice as fast as the Model 85, the next most powerful System/360. For example, in processing jobs with a large amount of floating point arithmetic -- such as matrix Eigenvalue calculations -- the Model 195 is 2.7 times faster internally than a Model 85 operating with a high-speed multiple feature."

To the computer using community, the Model 195 seems to be a giant rock crusher -- not really much of an advance in the computer-state-of-the-art, but so big that it can probably replace two or three 360/65s and have computational capability to spare. In the words, again, of the IBM watcher quoted above, it seems as though IBM poured all the components it could into a stylized box . . . and called it a computer. With all that logic and memory, the reasoning goes, how could the Model 195 fail to work?

This new supercomputer has an internal storage capacity of up to four million bytes, as well as a high-speed, 32K byte semiconductor buffer memory that cycles eight bytes to the central processing unit in 54 nanoseconds (billionths of a second). This doesn't appear to be as fast as Control Data's giant computer, the 7600, which transfers 60-bit (7 1/2-byte) words in only 27.5 nanoseconds. But the 195's price tag -- $7 million to $12 million -- closely parallels that of the 7600, pegged at $9 million to $15 million.

The price and size of the 195, therefore, would imply that it is designed for at least much of the same market that CDC hopes to reach with the 7600. Some people would argue, however, that the specifications of the 195 actually make it more competitive with CDC's 6600, priced "only" in the $4 million to $5 million range. And many of these same people think that the 195, really, is IBM's "protection" of its present dual 360/65 users. Its System/360 compatibility, as well as its ability to "perform many tasks in parallel," suggest that this is the case, with the major airlines constituting a significant portion of the Model 195's market.

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Early market stirrings

As a check on the market impact of the Model 195 (since IBM, as a matter of policy, does not comment on the market for its computers), EDP/IR this week talked to 10 computer users who have at least the equivalent of dual 360/65s. All of the users who had heard of the 195 had received briefing sessions on it from IBM and several were looking seriously at it. Two users contacted had already made preliminary decisions to order one. These two installations were among the country's largest. The "smaller" installations which may actually be the 195's biggest market had made no such commitment, but several said they were investigating the possibility.

- The major airlines, most of which now use the twin 360/65s in their reservation systems with a special airlines-package developed by IBM, are a prime potential market for the 195. All of the ones contacted by EDP/IR had received the IBM sales pitch and were investigating the 195, although none of them seemed to be in any hurry to decide.

- The market for the 360/85 may be impacted by the 195. The average monthly rental shown in the Monthly Computer Census indicates the 85 is in the same price range as the low end of the 195. EDP/IR's survey contacted two installations with 85s on order, but the results were inconclusive. One user had plans to order both the 195 and the 85, but the other was "still looking" and could not comment on the future of its 85 order.

- EDP/IR found no users of CDC 6000 series equipment (aside from Lawrence Radiation Labs, which uses everything) who had been contacted by IBM. As a rule, they knew very little about the 195, most of their information coming from their newspapers.

Even if it has left CDC users alone so far, IBM gives the appearance of trying to tap the large-computer market that CDC has almost come to feel it owns. For one thing, the rental-to-purchase ratio for the 195 is in the 40-to-1 to 42-to-1 range, similar to that of CDC's equipment, and lower than any such ratio IBM has offered on its computer systems before. It may well admit IBM's desire to sell many of these large computers.

One sure customer for the 195 is the Lawrence Radiation Laboratory, in Livermore, California. This Atomic Energy Facility has at least one of every "largest" computer ever offered commercially and, predictably, has the first CDC 7600 -- with an order for three more. The second should be delivered this fall. But, apparently, Livermore is never completely satisfied: A spokesman for the organization has told EDP/IR that it probably is ordering "several" of IBM's Model 195.

Prognosis

This approach, however, is not likely to be taken by even the largest commercial users of large computers. Those already operating CDC's 6000 series equipment will probably stay with the Minneapolis company and eventually upgrade to a 7600 or one of its offspring expected to be announced (EDP/IR Dec. 5,1968). Likewise, most large-scale users of IBM System/360 equipment will give positive consideration to the 195. In both cases, prior software investment and the horrendous prospect of massive reprogramming will virtually rule out a change from a



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manufacturer who has a compatible system. The only new markets for CDC or IBM, therefore, would seem to be those opened by users who have finally decided to make a quantum step in their application of computers.

This market is not as miniscule as one might imagine. Quite a few large companies are giving serious consideration to consolidating all their data processing needs into one location and through one or more large computers; others are definitely in the planning stages of setting up massive management information systems, centered around a distributed network of computers. Burroughs, Univac, and GE eye this new market . . . but CDC and IBM already have rather impregnable positions. The overall marketplace picture probably won't change too much because IBM has definitely committed itself to supplying as large a computer as it thinks it can sell. In a rather funny sense, IBM's entry into the supercomputer market will probably -- as has its efforts in most other areas -- give a "seal of approval" to the concept and strengthen the efforts by all other industry competitors. In this sense, the Model 195 is IBM's latest umbrella for the computer industry.

## FIRST TEST CASE OF SOFTWARE PATENTABILITY OKAYS CONCEPT, PUTS BURDEN OF PROOF ON INVENTOR

The first software patentability case to be heard by the U.S. Court of Customs and Patent Appeals -- the highest arbiter about patents below the Supreme Court, and in recent history, the final authority on patent matters -- has ended in a hesitant but faintly positive precedent. Most significantly, the Patent Office's policy of not granting software patents was overruled. The flavor and nature of the decision shows up clearly in the following passage:

> No reason is now apparent to us why, based on the Constitution, statute, or case law, apparatus and process claims broad enough to encompass the operation of programmed general-purpose digital computer necessarily unpatentable. [emphasis by the court]

Before this decision in the Prater and Wei case, the Patent Office had virtually placed a ban on all patents of software (The Goetz patent -- EDP/IR July 11, 1968 -- was based on a process, and the Patent Office would not offically admit that it had patented a program). The official position had been that to patent a method that could be performed mentally "would confer upon a patentee the right to exclude others from thinking in a certain manner [and] 'would run afoul of the First, Ninth, and Tenth Amendments to the Constitution.'" This blanket rejection, now, has been overturned on the ground that patents may be worded to cover the computerized execution of a process while still allowing free "mental" execution.

At the very least, the Prater and Wei decision clears the way for future decisions as to whether software concepts fit the legal language of the patent structure. Such problems have been surmounted before: Electrical circuits, for example, had to be classified as "machines" before they could be patented. Some such equally imaginative redefinition of the legal meanings of the words of the statute will have to be devised to fit software into the patent scheme. The Prater and Wei decision hints at how this redefinition is to be accomplished, but it left the question indefinite enough to require at least one more major court decision before the issue is finally resolved. Thus, it is fairly obvious that generalized patenting of software will take time and quite a bit of judicial imagination.



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The Prater and Wei case

Prater and Wei's patent claim was not based primarily on a software product. In fact, no software was included in it, either as a block diagram or in machine language form. It asked for patent coverage of a method of optimally analyzing spectrographic data based on a mathematical principle the two men had discovered. Although the principle itself is not patentable, mechanical means of exploiting it are, and the object of the patent claim was to obtain a legal monopoly of such mechanical means. The claim included a description of an analog method of applying the principles and the statement: "The flexibility of a digital computer lends itself to the solution of problems of the type above described and in most instances represents an instrumentality preferred for the carrying out of the method of the present invention."

The patentability of the basic process was never at stake, and therefore, became an ideal case for questioning the validity of the patent office's basic policy on software. The appeal went through the Patent Office Board of Appeals and then to the U.S. Court of Customs and Patent Appeals where what is probably the final verdict on this case was handed down. The claim was actually rejected, but in rejecting it, the court indicated that a patent could be issued if the claim were reworded to explicitly exclude mental execution of the process from coverage under the patent. In other words, the court rejected the patent office's basic premise, but also required that the claim be rewritten before a patent could be issued.

So . . . where do things stand?

As in all American court decisions of this type, the issue was decided on as low a level of principle as it could be. The courts do not try to write whole chapters of "case law" at once, but rather try to set as little precedent as possible. The case law pertaining to an area such as software patentability is constructed bit-by-bit as each case sets new precedents upon which future decisions can be based. (Like many slow and ungainly procedures still in use in this computer age, about all that can be said for this legal algorithm is that it eventually produces practial and workable results and that no better alternative is available.) Consequently, the scope and the nature of software patents will have to evolve slowly as individual cases test the frontier of the law. A more or less stable case law governing this area may be many years in coming.

There are some indications as to what the major issues of future cases are likely to be. Patents are issued on "machines," "methods," "arts," "processes," or significant improvements to one of these. The Prater and Wei case concerned a "process" in which the computer, incidentally, was a tool used in executing the "process." As a result of this decision, the patentability of the computerized execution of a "patentable process" seems assured, but such an approach is hardly applicable to the bulk of the software currently being developed. The patentability of software that does not fall under this "process" provision is still very much an unanswered question . . . one that will have to be resolved in future court decisions.

The decision did suggest the possibility that software, like the electric circuits mentioned earlier, might be patentable under the legal guise of being a "machine."



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"But once a program has been introduced, the general-purpose digital computer becomes a special purpose digital computer (i.e. a specific electrical circuit with or without electromechanical components) which, along with the process by which it operates, may be patented subject, of course, to the requirements of novelty, utility and non-obviousness. Based on the present law, we see no other reasonable conclusion."

The language is strikingly similar to that used in Applied Data Research's anti-trust suit against IBM (EDP/IR, April 24, 1969). It defines software as a "device used as a control attachment and machine extension for hardware." Such definitions are quite different from common industry usage, but perhaps the industry lexicon will be forced to undergo yet another change. Indeed, IBM may have started it with its "program product" terminology.

It appears that the suggestion in Prater and Wei about the "machine-approach" remains just that -- a suggestion. It will take several test cases to establish this approach and to determine how it should be applied in practice.

Software-hangups

The stated requirements for novelty and non-obviousness will likely cause future software patent applicants more grief than any other. Despite the rapidly growing sophistication of the computer user, the basic concepts for most processes currently being implemented on computers have been public knowledge for more than the one-year maximum age for patentability. For such software as a new sort routine or inventory control package to be patentable, it would have to be a "substantial improvement" on existing methods. A well-known patent lawyer tells EDP/IR that halving the execution time of a process would probably be classified an improvement "of degree" and would therefore, not be patentable. A 90% reduction in the execution time, however, would probably qualify as a "substantial improvement" and would be patentable.

And the non-obviousness requirement could well be the most sticky. This requirement states that the invention or improvement must not be obvious to a skilled worker in the field. Just because something has not been done before does not make it patentable. Imagine, therefore, trying to convince a judge that a new twist in an operating system or compiler was or was not obvious to a skilled engineer-programmer. This, without a doubt is going to happen.

Who wins?

As with many of the qualitative changes in the computer environment heralded by the industry's smaller firms as the "beginning of a new era," software patents will probably end up being in the manufacturers' interest far more than in that of the little firms."

It may be too early for predictions, since the evolution of case law for software patents has hardly begun, but it seems to EDP/IR that most of the significant software developments are made by mainframe manufacturers. Smaller firms, as a rule, offer improvements on what the manufacturers develop. In all likelihood, the bulk of any possible future software patents will be assigned to large manufacturers, just as have the hardware patents. On the other hand, there will always be an appreciation for the independently developed software products such as the automatic flowcharting packages now being marketed.



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## NEW REGISTRATIONS BY COMPUTER COMPANIES

*[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]*

| | |
|---|---|
| ATLANTIC INFORMATION SYSTEMS, INC. | Atlantic Information Systems, Inc., 100 East President Street, Savannah, Ga., a service bureau offering several services, on August 15, filed 400,000 common. The proceeds, at a price of $1.10 per share, will be used for equipment rental and salaries. The underwriter will be Johnson, Lane, Spcace, Smith & Co., Inc., 101 East Bay Street, Savannah, Ga. |
| C.T.P. COMPUTERIZED TAX SYSTEMS, INC. | C.T.P. Computerized Tax Systems, Inc., 75-12 Roosevelt Ave., Jackson Heights, Queens, New York, which proposes to establish a franchise of computerized tax preparation centers, on August 15, filed 100,000 common. The proceeds, at a price of $5 per share, will be used for the acquisition of such centers, for the training of personnel, and for working capital. The underwriter will be Whitehall Securities Corp., 138 Main St., Oceanport, N.J. |
| COMPUTER CONGENERICS CORPORATION | Computer Congenerics Corporation, 2000 Classen Blvd., Oklahoma City, Okla., which will engage in various phases of the computer business, on July 16, filed 400,000 common. Proceeds, at a price of $3.00 per share, will be applied to these and related purposes. The underwriter will be Shoemaker & Co., Inc., Oklahoma City, Okla. |
| COMPUTER SCIENCES CORP. | Computer Sciences Corp., 1901 Ave. of the Stars, Century City, Los Angeles, Calif., which provides services utilizing capabilities in the analysis, design, and implementation of computer and communication systems, on August 8, filed $50,000,000 of conv. sub. debentures due 1994. The interest rate and the offering price are to be supplied by amendment. The proceeds will be used for debt repayment, product development and working capital. The underwriter will be Goldman, Sachs & Co., 55 Broad St., New York. |
| DATA GENERAL CORP. | Data General Corp., Route 9, Southboro, Mass., which designs, manufacturers and sells small digital computers and related products and services, on August 15, filed 250,000 common. The proceeds, at a price to be set by amendment (max. $11 per share) will be used for research and development, marketing, manufacturing and working capital. The underwriter is Bache and Co., 36 Wall St., New York. |
| THE DELOS INTERNATIONAL GROUP, INC. | The Delos International Group, Inc., 100 State St., Boston, a leasing company with time-sharing operations in Great Britain, on July 11 filed 400,000 common. The proceeds, at a price to be set by amendment (mas. $12.50 per share) will be used for debt repayment, for equipment and for working capital. The underwriter will be Dempsey-Tegeler & Co., Inc., 1000 Locust Street, St. Louis, Mo. |



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|---|---|
| GRAPHIC SCANNING CORP. | Graphic Scanning Corp., 67 Broad Street, New York, which engages in facsimile transmission and plans to become a franchise of a protective credit card service, on August 4, filed 100,000 common. The proceeds, at a price of $6 per share, will be used to equip and staff a central data communications headquarters and to start the franchise. The underwriter will be E.L. Aaron & Co., 15 William Street, New York. |
| NATIONAL COMPUTER FRANCHISE CORP. | National Computer Franchise Corp., 4433 Touhy Ave., Lincolnwood, Ill., which establishes, on a franchise basis, time-sharing computer centers utilizing Honeywell equipment and programs, on July 15, filed 100,000 common and 100,000 warrants, to be offered in units of three shares and two warrants. The proceeds, at a price of $12 per unit, will be used to retire short-term debts, for program acquisitions, franchise promotion, and for working capital. The underwriter is Chartered New England Corp., 90 Broad St., New York. |
| NATIONAL INFORMATION SYSTEMS CORP. | National Information Systems Corp., 150 Allendale Road, Valley Forge, Pa., a company providing information services requiring a computer, on July 9, filed 202,779 common. The proceeds, at a price of $6 per share, will be used to promote the firm's entry into the remote facilities management field and for program conversion and implementation costs. There is no underwriter. |
| ON-LINE DECISIONS, INC. | On-Line Decisions, Inc., 2055 Center St., Berkeley, Calif., which rents a software package, Financial Analysis and Planning System, on August 12, filed 250,000 shares of common. The proceeds, at a price to be set by amendment (max $6 per share), will be used for expansion and research and development. The underwriter will be Hoppin Bros. & Co., 55 Broad St., New York. |
| SCIENTIFIC SOFTWARE CORP. | Scientific Software Corp., 5300 South Ulster Road, Englewood, Colo., a software firm, on August 15, filed 300,000 common. The proceeds, at a price to be set by amendment (max. $10 per share), will be used for debt repayment and for working capital. The underwriter will be Kleiner, Bell & Co., Inc., |
| SYSTEMS ENVIRONMENT CENTERS, INC. | Systems Environment Centers, Inc., 200 Terminal Building, 65 broad St., Rochester, New York, which proposses to run schools for training in the use of computers and to develop software, on July 14, filed 145,000 common and 145,000 warrants, to be offered in units of one share and one warrant. The proceeds, at a price of $6.25 per unit, will be used for course material preparation, advertising and start-up expenses. No underwriter is involved. |
| TEKRONIX, INC. | Tekronix, Inc., 14150 S. W. Karl Braun Drive, Tektronix Industrial Park, P.O. Box 500, Beaverton, Oregon, which designs, manufactures and markets a full line of high-quality laboratory and industrial cathode ray oscilliscopes, on August 4, filed 262,000 common. The offering price will be set by amendment and is not to exceed $60 per share. The underwriter will be Lehman Brothers, One William Street, New York. |



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August 4, - August 22, 1969

| | 1969 High | 1969 Low | 3 week Sales in 100's | 3 week High | 3 week Low | Last | 3 week Net Change | 3 week % Change |
|---|---|---|---|---|---|---|---|---|
| NEW YORK STOCK EXCHANGE | | | | | | | | |
| Addressograph-Multigraph | 82 3/4 | 59 1/2 | 1999 | 68 1/2 | 60 7/8 | 68 | + 6 | + 9.68 |
| American R & D | 229 | 154 1/2 | 551 | 229 | 188 | 229 | +35 3/4 | +18.50 |
| Ampex Corp. | 44 3/4 | 32 1/2 | 4728 | 41 5/8 | 37 | 41 3/8 | + 1 3/8 | + 3.43 |
| Bunker Ramo | 17 5/8 | 9 1/2 | 1290 | 11 1/2 | 10 1/2 | 11 1/8 | - 1/8 | - 1.11 |
| Burroughs | 147 | 120 3/4 | 2954 | 147 | 131 3/4 | 146 | + 9 | + 6.57 |
| Collins Radio | 69 3/4 | 38 5/8 | 1370 | 45 1/8 | 38 5/8 | 42 3/8 | - 2 3/8 | - 5.31 |
| Computer Sciences | 30 7/8 | 19 3/4 | 9393 | 26 1/8 | 19 3/4 | 21 1/4 | - 3 1/2 | -14.14 |
| Control Data | 159 | 125 1/8 | 7808 | 157 1/2 | 144 1/8 | 150 | + 2 | + 1.35 |
| Electronic Assoc. | 25 1/4 | 13 1/4 | 524 | 16 7/8 | 14 3/4 | 15 1/2 | - 1/8 | - 0.80 |
| General Electric | 98 1/4 | 81 1/4 | 3969 | 86 5/8 | 81 1/4 | 84 3/4 | - 1 5/8 | - 1.88 |
| Granite Computer | 25 3/8 | 15 | 729 | 16 1/8 | 15 1/8 | 15 5/8 | + 1/4 | + 1.63 |
| Honeywell | 140 3/4 | 107 3/4 | 1875 | 139 7/8 | 123 1/2 | 138 3/4 | +13 3/4 | + 5.10 |
| IBM | 354 1/2 | 291 3/4 | 4269 | 350 3/4 | 325 1/2 | 350 1/4 | +20 3/4 | + 6.30 |
| ITT | 58 1/2 | 46 1/4 | 5632 | 54 1/4 | 47 1/4 | 54 | + 6 1/2 | +13.68 |
| Leasco | 54 | 23 1/8 | 5576 | 30 5/8 | 25 3/8 | 27 1/2 | - 3/4 | - 2.65 |
| Litton | 74 1/2 | 37 1/8 | 4127 | 45 3/8 | 40 | 44 | + 2 1/8 | + 5.07 |
| Memorex | 94 7/8 | 65 | 2187 | 94 7/8 | 81 1/4 | 94 | +12 1/8 | +14.81 |
| National Cash Register | 139 3/8 | 108 | 2171 | 138 | 128 | 133 1/4 | + 1 1/2 | + 1.14 |
| RCA | 48 1/8 | 35 1/2 | 5424 | 38 5/8 | 35 7/8 | 38 5/8 | + 1/2 | + 1.31 |
| Raytheon | 50 1/4 | 30 5/8 | 1058 | 36 | 32 5/8 | 34 3/4 | + 3/4 | + 2.21 |
| Sanders | 61 7/8 | 22 5/8 | 1513 | 27 1/4 | 24 1/2 | 25 3/4 | - 1 5/8 | - 5.94 |
| SCM | 47 1/8 | 28 | 1435 | 34 | 29 3/8 | 33 5/8 | + 1 1/8 | + 3.46 |
| Singer | 84 1/4 | 62 | 1252 | 70 | 63 1/2 | 68 3/4 | + 2 3/8 | + 3.58 |
| Sperry Rand | 55 1/2 | 38 3/8 | 6412 | 44 5/8 | 40 1/4 | 44 1/2 | + 3/4 | + 1.71 |
| Teledyne | 45 1/2 | 28 1/4 | 4677 | 34 3/8 | 31 | 34 | + 1 3/8 | + 4.21 |
| Xerox | 100 1/2 | 85 1/4 | 8419 | 98 7/8 | 92 3/4 | 97 3/4 | + 3 5/8 | + 3.85 |
| NYSE COMPUTER STOCK AVERAGE | | | | | | | + 4.29 | + 2.91 |
| AMERICAN STOCK EXCHANGE | | | | | | | | |
| Applied Data Research | 32 7/8 | 24 1/4 | 378 | 30 1/2 | 24 1/4 | 24 3/4 | - 5 1/4 | -17.50 |
| Automatic D P | 83 1/4 | 63 1/4 | 167 | 80 1/8 | 72 1/2 | 79 3/4 | + 4 1/8 | + 5.45 |
| Calcomp | 37 1/2 | 18 1/4 | 628 | 26 7/8 | 20 1/4 | 23 3/4 | + 2 1/8 | + 9.83 |
| Clary Corp. | 25 3/4 | 10 3/8 | 434 | 14 3/4 | 11 1/2 | 11 3/4 | - 2 3/4 | -18.96 |
| Computer Applications | 21 7/8 | 9 1/2 | 358 | 13 5/8 | 10 1/4 | 13 3/8 | - 2 3/8 | - 2.16 |
| Computing and Software | 56 1/2 | 37 | 870 | 56 1/2 | 45 1/8 | 53 | + 7 3/8 | +16.16 |
| Data Proc. Fin. & Gen. | 60 1/4 | 23 5/8 | 1292 | 31 | 25 3/4 | 27 5/8 | - 3/8 | - 1.34 |
| Data Products | 27 7/8 | 12 3/8 | 1828 | 15 | 12 3/4 | 14 7/8 | + 1 7/8 | +14.42 |
| Digital Equipment | 72 7/8 | 54 1/2 | 2197 | 72 7/8 | 60 | 72 7/8 | + 8 7/8 | +13.92 |
| DPA, Inc. | 12 | 9 | 311 | 10 1/8 | 9 1/4 | 9 3/4 | - 1/8 | - 1.27 |
| Elect. Comp. Prog. In. | 38 1/4 | 12 3/8 | 251 | 15 1/2 | 12 3/8 | 15 1/4 | + 2 | +15.09 |
| Greyhound Computer | 28 5/8 | 12 5/8 | 260 | 15 1/4 | 13 1/2 | 14 1/8 | - 3/4 | - 5.04 |
| ITEL | 24 5/8 | 16 1/4 | 278 | 19 1/2 | 16 5/8 | 16 3/4 | - 1 1/4 | - 6.94 |
| Levin-Townsend Comp. | 57 1/2 | 24 | 1278 | 30 3/8 | 25 3/8 | 27 1/4 | - 1 | - 3.54 |
| Milgo Elect. | 34 1/2 | 17 7/8 | 671 | 24 1/4 | 22 1/4 | 23 1/4 | + 1/4 | + 1.08 |
| Mohawk Data Sciences | 89 1/8 | 59 3/4 | 2353 | 89 1/8 | 80 1/4 | 88 1/4 | + 6 5/8 | + 8.12 |
| Planning Research | 34 7/8 | 23 7/8 | 1242 | 34 7/8 | 30 1/4 | 33 | + 2 | + 6.45 |
| Potter Instrument | 35 3/4 | 23 3/4 | 578 | 30 | 27 1/8 | 30 | + 2 1/4 | + 8.11 |
| Randolph Computers | 43 7/8 | 18 | 2458 | 31 5/8 | 26 | 31 5/8 | + 4 1/8 | +15.00 |
| Sys. Eng. Labs. | 39 1/4 | 26 1/8 | 1812 | 39 1/4 | 32 1/8 | 38 5/8 | + 4 3/4 | +14.02 |
| Telex | 51 7/8 | 20 3/4 | 5615 | 51 7/8 | 41 3/4 | 50 3/8 | + 6 3/8 | +14.49 |
| AMSE COMPUTER STOCK AVERAGE | | | | | | | + 1.63 | + 4.07 |

| OVER-THE-COUNTER | 1969 High Bid | 1969 Low Bid | August 22, Bid | August 22, Asked | 3 weeks ago Bid | 3 week net change Bid | 3 week % change Bid |
|---|---|---|---|---|---|---|---|
| Aries Corp. | 19 | 6 | 8 1/4 | 8 3/4 | 7 | + 1 1/4 | +17.86 |
| Bolt, Beranek & Newman, Inc. | 19 | 7 1/2 | 12 1/2 | 13 1/2 | 10 3/4 | + 1 3/4 | +16.30 |
| Computer Usage | 40 | 8 | 8 | 9 | 16 | - 8 | -50.00 |
| Cyber-tronics | 12 1/2 | 7 | 9 1/2 | 10 | 7 3/4 | + 1 3/4 | +22.58 |
| Digitronics | 22 1/2 | 13 1/2 | 19 | 20 | 17 1/2 | + 1 1/2 | + 8.57 |
| Fabri-Tek | 12 7/8 | 7 1/2 | 8 5/8 | 9 1/8 | 9 1/8 | - 1/2 | - 5.48 |
| Informatics, Inc. | 30 1/4 | 20 3/4 | 23 5/8 | 24 1/8 | 23 | + 5/8 | + 2.72 |
| LMC Data, Inc. | 8 1/4 | 3 1/2 | 3 5/8 | 4 1/8 | 4 1/2 | - 7/8 | -19.44 |
| Management Assistance | 14 7/8 | 4 3/8 | 5 1/8 | 5 1/2 | 5 1/4 | - 1/8 | - 2.38 |
| Optical Scanning Corp. | 118 | 54 | 57 | 60 | 68 | -11 | -16.18 |
| Recognition Equipment, Inc. | 76 | 52 | 64 1/2 | 65 1/2 | 56 | + 8 1/2 | +15.17 |
| Tally Corp. | 36 | 15 | 20 | 21 | 18 | + 2 | +11.11 |
| TBS Computer Center Corp. | 36 | 11 | 18 1/2 | 20 1/2 | 19 | - 1/2 | - 2.63 |
| University Computing | 155 | 55 | 70 | 71 1/2 | 58 | +12 | +20.69 |



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